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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, AUGUST 18, 1905.

The killing of 12 persons in a butting collision near Vermillion, Ohio, last Sunday, conveys a startling lesson concerning the risks connected with our American method of running trains on single track, and the need of doing away with those risks; but so many equally startling lessons have been given in the past that one hesitates to use the term, and is tempted to doubt whether its dictionary definition still has meaning in connection with train accidents. Ohio was at one time called the "railroad-accident State," and the nearness of Vermillion to Mentor will tempt the reporters to now revive the name. The first significant thing brought to mind by the Vermillion collision is the statement, which has been uttered so many times by railroad managers, that the block system is being introduced "as fast as business demands it"; or "on the lines of heaviest traffic." The New York, Chicago & St. Louis has undoubtedly been left without the block system because it is not one of those lines (of its owners) which have the heaviest traffic. And yet it has traffic enough to kill people by the dozen. What is a line of "heavy traffic," from the humanitarian point of view? Or from the point of view of civic decency?

Near Bayonne, N. J., on August 4, there occurred a serious accident from the breach of a simple but comprehensive rule, which is often broken, and broken by men classed as careful, and yet which seems not to receive from superintendents the attention that it deserves. An eastbound express train of the Central of New Jersey was derailed at a point where track-changes were being made, and the engine fell into the water, killing the engineer. It was on the two-mile trestle bridge across Newark Bay, just east of the draw-bridge. A new facing point switch, not yet connected to the signal tower, and dependent for safety on being kept spiked, was left set the wrong way. There being no signal protection, the safety of trains depended, of course, on the unerring carefulness of the men doing the work and the vigilance and caution of engineers, who, presumably, were, by a posted rule, ordered to run under control over such a place in the track. A similar accident occurred at West Philadelphia a few months ago. A man repairing interlocked switches spiked a facing point crossover the wrong way, and an eastbound local passenger train ran into the side of a westbound fast express. This was in the night, when it was difficult for the engine-

man to see the rails, but the Bayonne accident happened in the daytime. At both places the man who made the mistake was standing near-by when the train ran off the track. The rule (or principle) to which we refer is that when we deprive ourselves of the benefit of signals it is essential to reduce the speed of trains correspondingly. "Correspondingly" means in proportion to the added difficulty of seeing obstruction or danger from the engine. Perhaps the added danger of such a place as a trestle bridge ought to be taken into account also, though it might well be that a crossover at such a busy place as West Philadelphia would present more chances of danger to life and limb than a switch on a less busy line nearer deep water. This question of reducing speed at all points where the track or its regular safety adjuncts may have to be disturbed, is classed as a difficult one, because we grudge every minute lost by fast trains. There would seem to be no way to settle it by rule, except in adopting and enforcing, a very radical rule—the rule that wherever switches are being changed, or the interlocking or the signals are being repaired, renewed or taken out, the speed of trains be reduced sufficiently to enable the engineer to see the rails of the track far enough ahead to stop if necessary. At night this would demand powerful headlights as well as very low speed. In many situations this will, of course, seem to be excessive caution; and yet with any provision less cautious than this we are trusting to the unaided vigilance of probably one man, the man in responsible charge of the track work. We may go on thus trusting to one man, with a high percentage of safety, for these men make very few mistakes of this kind; but the trouble is that where the result of a derailment is liable to be disastrous, no percentage less than 100 can be looked upon as tolerable.*

The terrible collision at Hall Road, England, on the Lancashire & Yorkshire, July 27† calls attention to the same rule as the Bayonne accident, though it emphasizes a different aspect of it. The essential trouble at Hall Road was one which afflicts many a signalman, and which is difficult to eradicate—the lack of sufficient mental poise to act deliberately when in a hurry. When one is calmly studying a rule book it is clear enough that, if a signal lever is found unexpectedly immovable, a thorough examination should be made of every

*The Lake Shore & Michigan Southern rules are given on another page.

†Reported in the *Railroad Gazette* of August 4; for additional particulars, see General News Section in this issue.

related part before concluding what is the matter; but when one fears that he is going to delay an important train, and sees that the question ought to be decided in half a minute, it is extremely easy to get "rattled." Only persistent training will cure this defect, in most minds; and this Hall Road signalman had been doing signal work only 18 months. This is a very unusual record for an English signalman. Records of 18 years are much more common. The use of a screw-unlocking device which requires a full minute to manipulate is favored, on some American roads, as a suitable means of compelling a signalman who is in an unreasonable hurry, to stop and reflect; but the device is not without its drawbacks, and it has never been used, so far as we know, to lock up hand flags. Even with a mechanical restraint the speed-reduction rule still remains an important element, and, as was intimated in the preceding paragraph, the only practicable way to prescribe speed limits satisfactorily is to lean to the side of conservatism—to make the rate of speed too low rather than too high. A facing point is a horrible danger to a fast train, except when it is in perfect order and perfectly protected by signals; and the slightest imperfection should be taken as a warning of the need of the utmost caution. It is only by drilling, of course, that such a high degree of caution (which may be needed only at rare intervals) can be infused into a signalman's mental habit. Unfortunately, no such drilling has been systematically attempted. We leave it to the slow educating processes of experience, and, in this matter, 18 months is a brief term. The very high reputation of English signalmen as a body is due to the fact that such a large proportion of them have had many years' experience, working through all the grades from booking boy up.

THE BALTIMORE AND OHIO RAILROAD.

As a result of the action of the directors last month the common stock of the Baltimore & Ohio was placed upon a 5 per cent. dividend basis, instead of 4 per cent., as during the past few years. Earnings have been very great, both gross and net, and the road seems to be entering upon a period of prosperity which comes as a most interesting sequel to the troubled years in the past. At the time of the reorganization in 1896, considerable attention was paid to the company in these columns. Prior to that, occasion was taken every year or so to criticize the extraordinarily bad annual reports—bad both in form and in substance—which were prevalent for many years, excepting only the brief period when Samuel Spencer took control and started reforms which were not carried out by his immediate successor.

The history of the Baltimore & Ohio naturally divides itself into periods that are pretty clearly marked. The road started its career in a burst of glory. Within eleven days after the subscription books were opened, March 20, 1827, 22,000 persons had subscribed \$4,178,000 of stock. The rails were then pushed westward, little by little. It is worth while to recount again the well-known historical fact that horses were the first motive power, and it was not until 1830 that the road was worked by steam. The history of the first five presidents—Philip E. Thomas, Louis McLane, Thomas Swan, William C. Harrison and Chauncey Brooks—is chiefly concerned with this period of preliminary extension. The road was opened to Harper's Ferry in 1834, to Winchester, Va., in 1836, to Cumberland in 1842, and to Wheeling in 1853. But though this Wheeling connection was nominally made during 1852, ready for use at the opening of the new year, the railroad remained embarrassed and practically ineffective until 1856. The man who made the Baltimore & Ohio a real railroad, connected up at both ends, and gave it an active place among the great transportation systems of the country, was John W. Garrett. Mr. Garrett's father, the original Robert Garrett, was a wealthy Baltimore merchant and banker. His son became associated with him as a young man, and was made a director of the Baltimore & Ohio in 1857 at the urgent request of influential citizens of the town that had so active an owning interest in the road. When Chauncey Brooks resigned as president, in November, 1858, John W. Garrett was elected to fill his place. Mr. Garrett was then 38 years old. In his first year of service the road increased greatly its earnings, both gross and net. Mr. Garrett harmonized the hitherto conflicting interests, and when the war broke out the Baltimore & Ohio was at its first flood tide of prosperity. The railroad ran right through the heart of the war country. It was fought across by both armies. There was much destruction of property and much blocking of traffic by the use of portions of the line as a military railroad; but the property continued to be strong, useful and well-managed. It was more than domineered by its president—it was

ruled by him, and Mr. Garrett's help was much appreciated by Secretary Stanton and by President Lincoln. Under this forceful management the road made constant gains, and when peace was declared it was in a situation of even greater prosperity than when the war began.

But in the era of railroad consolidation which began about that time, the Western railroads began to link up connections of their own that took traffic away from the Baltimore & Ohio, and threatened the very existence of Baltimore as a port. So Mr. Garrett arranged a system of roads of his own in the West, while in the East he made arrangements to ship freight through to Philadelphia and New York. It is suggestive of the differential quarrels of the present day that, by that very act, he was accused of discrimination against Baltimore, in 1860, because he gave the Western roads rates to New York and Philadelphia no higher than the rate to Baltimore for the sake of drawing traffic through his route instead of having it diverted to some other railroad.

John W. Garrett brought the quotations on the company's stock up from \$46 in 1858 to \$174 in 1884. He served the railroad as president for 26 years. A man of most forceful personality, he was a good deal of an autocrat. He always wanted his own way, and it was hard for him to make concessions to other managers. Throughout the latter years of his presidency the Baltimore & Ohio was often a disturbing element in trunk line business. It was at a disadvantage as compared with New York, and was sometimes prone to be a rate-cutter. In the latter years of Mr. Garrett's rule he was fond of referring to his company's immense surplus of undivided profits, a surplus which made an impressive showing on paper; but, as a matter of fact, his methods of finance, especially during the latter part of the '70s and the early '80s, were far from being above criticism. His great surplus did not earn much for him, and quite a share of the undivided profits to which he referred so fondly were invested in properties which yielded no income. There came to be a well-defined suspicion—not to express this more concisely—that many of his latter investments in subsidiary companies were made chiefly as an excuse for raising money; some of which was needed for obligations already assumed, and some of which presumably helped to pay dividends. In spite of the undivided surplus the company was often sorely in need of money.

John W. Garrett died in 1884, and was succeeded by his son, Robert Garrett, who had been closely associated with his father in the management of the road for several years. With the death of the elder Garrett the second distinct period in the history of the road came to a close.

Robert Garrett was president from 1884 until 1887. He found a property full of loose ends, with a complicated and uncertain debt, and a system of making annual reports which quite effectively prevented outsiders or insiders from learning anything about the road, except that it was not increasing its earnings in anything like proportion to the constant increases in its indebtedness. The share capital was small. In 1887 it only amounted to about one-eighth that of the total capital issue, and, say, one-eleventh of the total capital which had been expended. The younger Garrett was of less forceful personality than his father. He tried to make the property still greater and more cumbersome, without any attempts at cleaning up the waste. We said in the *Railroad Gazette* at the time, that many of the company's troubles under the younger Garrett were due to enterprises begun by his father, but it is certain that Robert Garrett had no clear perception of the procedure that was necessary to restore the property to a really solvent basis, and it is probable that he failed to realize that such restoration was even advisable. When new money was needed, new enterprises continued to be taken up, while the capital indebtedness was swelled unceasingly. In 1886 the capital account was \$45,000,000 greater than in 1873, while profits were only \$835,000 greater. In 1886, with 1,690 miles of line, gross earnings were 18½ millions, and net earnings 6½ millions. Five years before, with 200 miles less line, both gross earnings and net earnings were greater, and ten years before, with 238 miles less line than in 1886, gross earnings amounted to over 15 millions and net earnings to nearly 5½ millions.

A thoroughly characteristic enterprise of the years of Robert Garrett's presidency was the building of the Philadelphia division. The road needed badly enough to get into New York on its own tracks, but the undertaking cost twice the estimate and nearly swamped the company. The 1886 report, characteristic of this period, was so blind in its references that it brought out a sharp reproach in financial circles. What it did show, with sufficient clearness, was a deficit of over one million dollars from branch line working during the year, and it was evident that all of the complex

system of branch line property was in pretty bad shape. The younger Garrett, coming as he did from a prominent and distinguished Baltimore family, was much given to society life, and these two men, father and son, suggest quite an interesting parallel between the Hydes, father and son, in the up-building and subsequent management of the Equitable. In both cases the father was a man of great force and personality, who accomplished great results, but did not always scruple to make use of questionable financial methods. In both cases the son adhered to his inheritance of questionable finance rather than to his inheritance of strength. During the younger Garrett's presidency two attempts were made to get the road out of its difficulties by syndicate purchases of the property, but both attempts were unsuccessful. The failure of the last one, which was long-pending, created a depression which almost wrecked the road. Robert Garrett died in July, 1896. It was evident even before his resignation that he was losing his mind, and the last years of his life were spent in retirement.

When Mr. Garrett resigned from the presidency of the Baltimore & Ohio, in 1887, he was succeeded by Samuel Spencer, now president of the Southern Railway, who had had a long and valuable training with the Baltimore & Ohio. Mr. Spencer's methods were radical. Placed in a position of great difficulty, he at once analyzed the finances of the road, and in 1887 presented a report which was frank and honest, although it made a thoroughly bad showing, and revealed the innate rottenness of the property. In one year Mr. Spencer reduced the floating debt, which had been one of the great causes of uneasiness, from \$8,769,000 to \$3,478,000. He showed that the old surpluses were nothing more than forced profit and loss balances. Had Mr. Spencer remained president there is every reason to suppose that the subsequent history of the road would have been quite different from what it was, and that he would have created a new period in its development; but he served only for about a year, after which he accepted a position with Drexel, Morgan & Co. His presidency, therefore, instead of marking a distinct period in the history of the road, was really only incidental in the twelve bad years which received their definite beginning with the accession of the younger Garrett in 1884, and extended through the presidency of Charles F. Mayer, which terminated in 1896.

Mr. Mayer, before going to the Baltimore & Ohio, was for several years president of the Cumberland & Pennsylvania. The only thing that really stands out in his administration as constructive work was the increase of the western and southwestern extensions and improvements at tide-water; but these changes were made at great cost. Gross earnings in 1889 (Mayer) were \$21,303,002, and they continued about the same until the road went into the hands of receivers in 1896, except for the especially good returns in 1893 occasioned by the World's Fair at Chicago; but between 1889 and 1895, 25 million dollars was added to the debt. After the financial straightening out accomplished by Mr. Spencer in 1888, dividends on the common stock were suspended for several years; but a stock dividend of 20 per cent., not earned, was declared in 1891, and the next year cash dividends were resumed on the increased capital, and 3¼ per cent. was paid. Five per cent. was paid in 1893, 4½ per cent. in 1894, and none was paid on the common stock in 1895, although dividends were paid on the first and second preferred.

Following the resignation of Mr. Mayer and the close of this depressing period in the road's history, John W. Cowen was made president January 24, 1896, and the inevitable receivership followed a month later. Mr. Cowen had been General Counsel of the road for twenty years, and was a thoroughly sound, conservative and progressive lawyer. He was made joint receiver with Oscar G. Murray, now president. This was the only receivership the road ever went through, and its fundamental causes may be well understood from what has been said. The immediate cause of the insolvency was the inability of the directors to raise about \$400,000 to meet interest payments due March 1, 1895. The directors failed in their efforts to make a collateral trust loan, but the cause of the downfall, as we pointed out at the time, was plainly attributable to the large and constant increase in capital and fixed charges with no improvement in the earning ability; although unearned dividends were persistently paid on the small outstanding capital stock, which received large sums annually and sold at prices that reflected little more than the determination of the directors thus to favor it. It must be recollected that the B. & O. had no monopoly of bad financial management at this time, but, with the exception of the Wisconsin Central, it was the last to be reorganized of the big lines forced into insolvency in the hard years following 1893.

An excellent report on the finances of the property, open to criticism only on the ground of being over severe in its attitude towards

the apportionment of charges between capital and income, was made by Mr. Stephen Little in 1896. This report started with Mr. Spencer's year, since his work brought the finances in an understandable state up to 1888, and continued the record up to 1896. Mr. Little grouped under six heads the great errors in accounting, thus:

Over-statement of net income.
Mischarge of worn-out equipment to profit and loss, instead of to income.
Capitalization of charges to income.
Capitalization of so-called improvements and betterments of subsidiary roads.
Payment of unearned dividends.
Under-statement of liabilities.

Taking the first four, the discrepancy as presented by Mr. Little and in the statements of the company, was no less than \$11,204,859. From 1888 to 1896 dividend payments were \$6,269,008, including a stock dividend of 20 per cent. Mr. Little estimated that only \$971,447 of this was earned, although, as we have said, he charged certain items to income with even greater strictness than is required by the present best practice. But even including Mr. Little's full system of charges to income, he showed that the company during this period could have claimed an average surplus of \$136,550 each year, after paying the regular \$300,000 dividends on the preferred had it properly applied its funds.

Mr. Cowen's entire service as president and receiver covers about five years, and marks out a distinct period of development. The receivership ended June 30, 1899, when the new company took formal possession, and foreclosure was not gone through with. A reorganization plan on which two committees worked from 1896 to 1898 had been put into effect, and most of the exchange of securities had been effected. In carrying out this plan the old common stock was assessed \$20 a share, and the old preferred stock \$2 a share. The old company had some 90 millions of bonds and 30 millions of stock; the new company had 133 millions of bonds and 75 millions of stock. The host of divisional and subsidiary bonds were retired, and the bonded debt was unified under two general mortgages which covered between them the entire property and equipment, and were large enough to provide for future needs. There was no scaling of principal, but the interest rate was reduced. The fixed charges of the company, amounting to approximately \$6,250,000, occasioned a saving of some \$1,520,000 as compared with the fixed charges of the last fiscal year before the reorganization.

Mr. Cowen was an active and progressive president. Between 1894 and 1899 the average ton-mile rate was cut nearly in half, falling from 6.48 mills to 3.90 mills. Between 1896, the year of the receivership, and 1900, the last year when the annual statement did not include the returns from the Baltimore & Ohio Southwestern, freight ton-miles per mile of road increased from 1,357,701 to 2,587,123. Gross earnings increased from \$23,944,781 to \$34,890,226, and net earnings increased from \$6,361,361 to \$12,359,443. The addition of the Baltimore & Ohio Southwestern's returns made the showing even better, and the common stock, which during the first part of Mr. Cowen's presidency had been quoted around 30, rose to par in 1901.

The Pennsylvania, in recent years, had acquired considerable holdings of Baltimore & Ohio stock, and this influence led to the next well defined period in the history of the road, when L. F. Loree became president, in May, 1901, and the Pennsylvania took a strong representation in the directorate. Mr. Loree's work is fresh in every one's mind. It is sufficient to say that he carried on aggressively the large scheme of rebuilding and betterment work inaugurated by his predecessor. This work has been described fully in the *Railroad Gazette*. We pointed out that the traffic summit and the topographical summit of the line about coincide, in an area east and south of Pittsburg. Mr. Loree aimed to reduce the mountain grades and the severe curves, and make the line fully able to compete for tide-water tonnage with the lower grade lines to the northward. Besides this, he changed, to a considerable degree, the theories on which the working staff had been recruited, organized and maintained; a class of work which was rather outside the immediate scope of Mr. Cowen's interests and training in spite of his marked success as an administrator. Mr. Loree remained president of the Baltimore & Ohio only two years and a half, but left the property well advanced from the position in which he found it. In the general standards of honesty, courage and good administration, Cowen, Loree and Murray stand together as contributors to the current epoch of the road's history—an epoch of sound finances, earned dividends and notable increases in earnings. During a portion of Mr. Loree's administration, in 1902, the traffic on the road was too heavy for the best efficiency, and the Baltimore & Ohio suffered, like all the trunk lines, from congestion of freight; but this difficulty was not of long duration. After the accession of Mr. Loree, a majority of the Reading stock was divided between the Lake Shore and the Baltimore & Ohio, carrying a New York entrance over the Central Railroad of

New Jersey, and something like half the unmined anthracite in Pennsylvania.

On December 29, 1903, Mr. Loree was elected president of the Rock Island System, and was succeeded by Oscar G. Murray, who had served as first vice-president of the Baltimore & Ohio since 1896, and was joint receiver with Mr. Cowen for three years. With the exception of the receivership period, Mr. Murray's training had all been in the traffic department, but he came to the presidency with a full knowledge of the property and full sympathy with the best traditions of its latter years. A man of simple and direct nature, always approachable by his subordinates, he has done much to weld a spirit of loyalty and *esprit de corps* throughout the service. No landmarks in the history of the property are attributable as yet to his administration, but the road is at last enjoying the fruits of honesty and good management. When Mr. Murray's report is issued this fall it will be the seventy-ninth consecutive document of this character; a record of continuous history which no other company in the country can equal.

New Haven's Electric Finances.

In the form of a round number and in "net" shape the New York, New Haven & Hartford has given out the receipts for the fiscal year ending June 30, of the great electric system owned or controlled by the Consolidated Railway Company as a holding corporation. The "net" returned over and above all operating expenses and fixed charges is \$426,000, or about 4¼ per cent., on the Consolidated Railway Company's stock capital, which is all owned by the parent steam corporation. From this, however, is to be deducted approximately \$350,000 of interest on the issue of about \$10,000,000 of debentures of the steam corporation—a direct obligation used for the purchase of the Fair Haven & Westville system. Subtracting that amount it leaves \$76,000 as the net profit of the first year's operation of the Consolidated Railway system—though it is likely that, in the case of some of the street railway lines acquired during the year, figures are included which do not fall into the period during which the holding corporation has been operating those lines.

Stated in somewhat different words, during the first year of its great electric ventures the New Haven Company seems not merely to have made good its investment but earned \$76,000 besides—and to the \$76,000 should be added some \$80,000 a year which was being, in past years, lost annually on the Worcester & Connecticut Eastern system and which now is "digested" in the general financial returns of the Consolidated Railway Company. Such a showing is certainly remarkable and goes far, as a precedent on a very large and varied scale, to justify the theory of the purchase of electric by steam companies. It is to be recalled that while the Consolidated Railway system does not include the old steam lines electrified of the New Haven Steam Company it does include a vast and diversified assortment of street railways. There are lines in considerable cities like New Haven and Hartford and lines in small cities like Meriden, Stamford and Middletown. There are suburban lines and "cross-country" lines; lines with high pressure of traffic and lines with scant traffic and unprofitable; and, finally, perhaps one-third of the total street railway mileage of about 560 miles competes directly or indirectly with the steam road. As to the absolute size of the system it may be stated further that it represents now some 25 lines of street railway originally independent and with capitalization in all forms of liability of some \$32,000,000—though a considerable part of this was originally water both in stock and bonds. When it is remembered also that the New Haven Company has had to buy up such street railway systems as those of New Haven, Hartford and Springfield at a very high price the result of the first year's return becomes the more emphatic—saying nothing of the radical conversion of President Mellen himself to the electric theory which he disapproved so strongly during the first ventures of President C. P. Clark.

While no details are given of the earnings of the separate railways of the system it is probable that the earnings show the largest increase both relative and absolute in the cities. In one city—New Haven—it is very likely due to the strenuous efforts lately made to check pilfering of fares by employees of the street lines. But, in general, reduced cost of operation under consolidation and increased business are probably the main elements in the showing. If that increase keeps up we may yet see realized a prophecy of President Mellen that his street railways will ere many years earn 1 per cent. on his steam company's capital of \$80,000,000. But whether that expectation is realized or not there must be set to the credit already of his great electric venture the advantages of control of his former electric competitors and of the operation of steam and electric lines in harmony instead of rivalry. On the negative side is to be set, as his chief peril, the results to his electric system of a period of financial depression.

While we have been hearing so much of the New Haven Com-

pany's expansion in the purchase of electric railways we have been hearing much less of its plans for electrifying of steam roads in New England. But we fancy this is merely a pause and not the surrender of a policy which President Mellen has proclaimed. It will be noticed that no change has been made either in the steam roads already electrified or in electric plans relating to suburban New York. For the moment and the moment only President Mellen's active purchase of trolley roads has probably beated larger schemes of electrification. Meantime as one token of fresh schemes of electric expansion may be remarked the official claim a few days ago of the New Haven Company that under the remarkable "omnibus" charter of the Consolidated Railway Company, granted by the last Connecticut legislature, that corporation can buy up and utilize any realty that it pleases without considering public interest or any appeal to the rights or privileges of eminent domain.

Real or searching criticism of railroad annual reports was, fifteen years ago, "in its infancy," says the *Wall Street Journal*, in a retrospect which we reprint in another column. Only by slow stages did "those who study railroad reports" learn to look intelligently into expenses, train loads and other light-giving items. This retrospect is an interesting paragraph and therefore we copy it; but we cannot refrain from completing it by remarking that the reason why the "financial district" and the other students here referred to did not learn railroad affairs faster was that they did not read the *Railroad Gazette*, which fifteen years ago had been making illuminating studies of railroad reports for 15 years and more. President Hill, of the Great Northern, says our *Wall Street* reviewer, first taught financial men the economy of large train loads, and "very largely" taught the railroad world the same lesson. It will probably be difficult to find any considerable number of citizens of the railroad world who will admit having sat at the feet of the St. Paul prophet to receive this lesson. It seems to us that the men who designed the powerful locomotives and the 50-ton cars were the ones who taught us to run big train loads—or, rather, that the dullest of us knew enough to practise this economy as soon as we had the instruments to do it with. Mr. Hill and other financial leaders performed an important function in seeing that roadway and bridges and other fixtures were improved as fast as was necessary to accommodate the heavier engines. Our friends of the financial district will do well to keep a sharp eye on "C. T." expenses, and keep them in the center of the stage, as is suggested; but we fear that one of the actors at the extreme left of the stage may baffle them now and then; that is the general manager who, for reasons of his own, determines not to tell the financial district just how he is spending all of his money this year!

NEW PUBLICATIONS.

Earth and Rock Excavation: A Practical Treatise. By Charles Prelini, C. E. New York: D. Van Nostrand Company. 1905. Octavo, vi+357 pages, 167 figures. Cloth. \$3.00.

This volume is an attempt to give a concise and comprehensive treatment of earth and rock excavation together with the method of planning and computation of such work, and description of the machines by which it is accomplished. It begins with a description of the ways of graphically representing earthwork and a discussion of the different ways of measuring the same. In Fig. 8, on page 16, B should be A, A should be B; and on the same page

the formula, cut = $\frac{B^2}{A_1 B_1} \cdot \frac{d}{2}$ should be cut = $\frac{B^2}{A_1 + B_1} \cdot \frac{d}{2}$; and at

the top of page 17 the expressions for cut and fill are interchanged. In chapter III, rules for locating a grade line on a profile are given and discussed somewhat in detail. The author cites cases in which it would be more advantageous to waste and borrow than to balance the cuts and fills when over-haul would be necessary. In connection with this the author makes the statement, "In the United States no attention is paid to the distribution of volumes along the line, either in public or in private works." "As a consequence the mean distance of haul is not known, and earthwork is never calculated on scientific principles in the United States." The tabular method used by Italian engineers for obtaining the distribution of masses and the mean distance of haul is then given, as well as the graphical methods of the German and French engineers. In the description of hand-drilling, the drills shown in the figure do not correspond to the description in the text, and both the drills and hammer are different from those generally used. Very good illustrations of two types of machine drills are given; 21 pages are devoted to the history, composition, transportation and storage, and relative value for blasting purposes of gunpowder, dynamite and nitroglycerine. These are described quite thoroughly in a theoretical way, but there is little to indicate which one should be used in a certain rock. The preceding comprises the first 87 pages of the book. The balance of the book is devoted to a discussion and description of earth excavation and excavating machinery. The subject is handled in a general way until the subject of earth excavation is reached. This is treated in some detail, and the most val-

uable part of the book is the discussion of the relative distance most economical to haul excavated material by barrows, carts, wagons and tramways. Tables are given showing the number of round-trips, the amount of material moved, and the cost per cubic yard of hauling for distances between the proper limits for each.

W. L. W.

Universal Directory of Railway Officials 1905.—Prepared under the direction of S. Richardson Blundstone, Editor of *The Railway Engineer*. The Directory Publishing Co., Ltd., 3 Ludgate Circus Buildings, London E. C. 4; R. A. Bagnall, 132 Nassau street, New York, sole representative for the United States. 598 pages, 5x8-in. Subscription price, 7s. 6d.; after publication 10s.

The field covered by this most useful directory is well known. It only needs to be said that it contains a careful list of the principal officers of every railroad in the world, together with a brief statement of the mileage of the road; of its gage, and of its equipment. In Great Britain the tramway lines are also included, although this is not true in other countries. The book is excellently indexed, containing in the back an alphabetical list of all the officers included in the book, with a paragraph reference to their companies. The companies themselves are likewise indexed alphabetically in the front of the book. This directory is a thoroughly careful and reliable publication, of very great value to persons who wish the principal physical characteristics and the personnel of the world's railroads gathered together in compact form for instant reference.

TRADE CATALOGUES.

In 1894, the Master Car Builders' Association, for convenience in the filing and preservation of pamphlets, catalogues, specifications, etc., adopted a number of standard sizes. The advantages of conforming to these sizes have been recognized, not only by railroad men, but outside of railroad circles, and many engineers make a practice of immediately consigning to the waste basket all catalogues that do not come within a very narrow margin of these standard sizes. They are given here in order that the size of the publications of this kind, which are noticed under this head, may be compared with the standards, and it may be known whether they conform thereto.

Standards.	
Postal-card circulars	3 3/4 in. by 6 1/4 in.
Pamphlets and trade catalogues.....	3 1/2 " by 6 " "
	6 " by 9 " "
	9 " by 12 " "
Specifications and letter paper	8 1/4 " by 10 3/4 " "

Oil Storage Systems.—Catalogue 4 of S. F. Bowser & Co., Ft. Wayne, Ind., is entitled "Bowser Oil Storage Systems." It illustrates and describes oil storage systems and oil house equipments, including adjustable measure oil cabinets, self-measuring oil outfits, navy oil tanks, underground storage tanks, etc. The storage systems are illustrated by half-tone engravings from drawings showing buildings with complete installations applied, the walls, flooring, etc., being broken away to show all details. A variety of measuring outfits, navy oil tanks, storage tanks, etc., are also illustrated and described in detail.

Twist Drills, Reamers, etc.—The Cleveland Twist Drill Co., Cleveland, Ohio, has issued a new catalogue and price list of its tools for turret lathes and screw machines, including oil tube twist drills, fluted chucking reamers, shell reamers, turret tool holders and floating tool holders. This latter tool holder is of special benefit in holding and driving finishing reamers. It is self-compensating to counteract any inaccuracy in the alinement between the turret holes and the spindle or work, and will allow the reamer to cut a straight hole its own diameter.

Valves.—The Crane Co., Chicago, is distributing its special jubilee number of *The Valve World*. The cover bears a picture of R. T. Crane, the founder and president of the company. The Crane Co. was started in 1855, and this issue of *The Valve World* is devoted chiefly to a history of the company and its progress during the past 50 years. Descriptions and illustrations of its home office and of its branch offices throughout the world are given.

Wheel-Truing Brake Shoes.—The Wheel Truing Brake Shoe Co., Detroit, Mich., sends a folder in colors depicting summer scenes and entitled "In the Good Old Summer Time." The text states that while operating expenses of railroads are less in summer, flat or worn wheels are expensive at any time. The cheapest and most effective remedy is the use of this company's shoes on such wheels.

Continuous Gas Producer.—The Morgan Construction Co., New York, is distributing a neat catalogue of the Morgan continuous gas producer. It contains upwards of 50 pages and 16 illustrations showing various views and cross sections of the machine. A full detailed description of the construction of the producer is given as well as the method of operating it. The advantages to be derived from its use are also clearly set forth.

Electric Railroads.—The Railway Electric Power Company, 114 Liberty street, New York, which is the sole lessee in America of the patents of Ganz & Co., Budapest, Hungary, on a three-phase alter-

nating current electric traction system, is distributing a large pamphlet containing a complete description of the Valtellina Railroad in Switzerland, reprinted from the "Organ for Progress in Railway Matters." This description was printed in liberal abstract in the *Railroad Gazette* and covers the entire installation, its operation and economy. The pamphlet contains a large amount of interesting and valuable data on heavy electric traction problems.

Rock Drills.—The Ingersoll-Sergeant Drill Co., New York, has just issued its new rock drill leaflet. The various types of drills made by this company, the different mountings and the special advantages of the principle types are briefly stated. Illustrations throughout show the drills as used in various classes of work.

Frogs and Switches.—Catalogue A of the Weir Frog Co., Cincinnati, Ohio, illustrates a large number of frogs and special work made of light rails for electric railroads, coal mines, plantations, factories, etc. The frogs shown are made of rail from 12 to 40 lbs. per yard.

Air Lift Pumping.—This is the title of a small pamphlet issued by the Ingersoll-Sergeant Drill Co., New York, in which a few of the possibilities of air lift pumping are briefly stated. Catalogue 73 of this company gives complete information on the subject.

Electric Trucks.—Record of Recent Construction No. 50, published by the Baldwin Locomotive Works, Philadelphia, Pa., contains illustrations and general specifications of 13 of the latest types of trucks for heavy electric traction.

Pipe Dies and Valves.—The Crane Co., Chicago, sends advance circulars of its sectional and solid easy cutting pipe dies. Also of its combination back-pressure and exhaust relief valves and butterfly hot water radiator valves.

Cutting and Punching Machinery.—The Krips-Mason Machine Co., Philadelphia, Pa., send an illustrated folder descriptive of its punching machine, which is especially adapted for making washers and discs for armatures.

Disastrous Collision at Kishmans, Ohio.

In a butting collision on the New York, Chicago & St. Louis at Kishmans, near Vermillion, Ohio, about four miles west of Cleveland, on the morning of August 13, at one o'clock, 12 persons were killed and many others were injured. An eastbound passenger train ran at full speed into a westbound freight. Most of the killed were Italian laborers riding in the smoking car of the passenger train, which was crushed for half its length by the car behind it. Of the 39 passengers on this car nine were killed instantly. The freight train should have taken the side track at Kishmans, but it ran 2,000 or 3,000 ft. beyond. No explanation has yet been given as to how the freight came to thus encroach on the time of the passenger.

Rules for Signal Repairmen.

In connection with the recent derailment at Bayonne, N. J., and the collision at Hall Road, England, which are briefly discussed on the editorial page of this issue, the reader will be interested in the following extracts from the rules for securing the safety of trains, when signal fixtures are being changed, or parts are out of order, which have recently been adopted by the Lake Shore & Michigan Southern. A notice of this new book of the Lake Shore was given in the *Railroad Gazette* of July 28, page 80. Following the Lake Shore rules we give an extract from the English clearing-house rules on the same subject.

RULES FOR REPAIRMEN, L. S. & M. S. RY.

542. They must not make any alterations or additions to the work under their charge without instructions from the supervisor of signals.

543. When it is necessary to do any work requiring the disarrangement of locking devices, the repairmen in charge shall first obtain authority from the supervisor of signals, including instructions as to the time that the work shall be done. Before starting the work he shall wire the division superintendent and obtain his o-k for authority. He shall then personally notify the signalman and shall note on the block report of the tower the words, "locking disarranged," giving the numbers of the levers affected, the time at which the work is started, and his signature. Before disarranging the locking, he shall first disconnect all switches and signals affected by the work, and shall spike the switches in their normal position, thus insuring the proper protection of all movements involved in the disarrangement of the locking. When the work is complete and the locking restored, he shall personally notify the signalman and shall note on the block report the words, "locking restored," giving the time at which the work is completed and his signature.

He shall then wire the division superintendent and the supervisor of signals that the work is complete.

544. During the time that the locking is disarranged trains shall be forwarded on caution cards or clearance cards the same as for any failure of the apparatus. (See rule 363 below.)

545. No movements shall be disconnected or circuit cut out except in case of actual necessity, but when such necessity exists, the repairman shall first notify the signalman and shall note on the block report the words "No. _____ disconnected," inserting the name of the movement in the first blank space and the number of the lever in the second, together with the time and his signature. When the movement is again connected up and regular working restored, he shall enter under his previous note the words, "Regular working restored," again giving the time and his signature.

546. Repairmen, in addition to recording on train sheets of towers any disarrangement of locking or disconnecting of operating devices, will, in addition, secure the acknowledgment of the signalman for all such repairs upon the form provided, and send same to the office of the supervisor of signals on completion of the work.

547. If necessary to disconnect any switch, facing point lock, detector bar or drawbridge lock, electric circuit, or any similar device affecting the safety of the track, the repairman must first confer with the section foreman and arrange for the proper protection of the track by flagman under the section foreman's direction.

548. The repairman must fasten at danger all signals protecting the movements to be disconnected, and must personally see that the flagmen are properly protecting the tracks concerned in accordance with transportation department rule No. 99, before any movement is disconnected. Whenever a switch or movable point frog is disconnected it must be spiked in position before any train is permitted to pass over it.

549. Repairmen shall adjust switches and movable point frogs with a standard switch gauge, and if the gauge of the track is incorrect, or the stock rail is improperly bent ahead of the points so that they do not face up properly, he shall notify the section foreman in writing, and if the necessary change is not promptly made, he shall notify the supervisor of signals. In the meantime the points must be adjusted to fit the stock rails as they are, so that there may be no possible chance of a wheel taking the wrong side of a point. If by any chance the gauge should be so defective as to render such adjustment impossible, the repairman shall disconnect the switch and spike it in the normal position, also disconnecting the signal for any diverging movement over that switch. He shall also make record of the occurrence on the block report in accordance with rule 545, and shall notify the division superintendent and supervisor of signals by wire. He shall also follow up the case and see that regular working is restored as promptly as possible.

550. In connecting new work, switch points must be kept spiked until the signals governing movements over them are connected up. Also arrange to have sectionmen stationed at the tower as long as the switch is disconnected, and to throw the disconnected switch by hand, under the direction of the signalman.

551. No apparatus shall be cut out of service without the authority of the supervisor of signals, and then only after notice by wire has been sent by the repairman to the division superintendent for his information.

363. When, from any cause, the home signals of an interlocking plant cannot be cleared, trains will not be forwarded on hand signals, but on caution card, except that when signalman has ascertained that the block is clear between the interlocking and the next block signal in advance, he may forward trains on clearance card instead of on caution card.

364. When any signal governing a switching movement cannot be cleared, hand signals may be used, but they must be authorized by the signalman and given from the ground, upon the track for which they are intended, and only after the train or engine which is to make the movement has been brought to a stop, and the situation fully explained and understood.

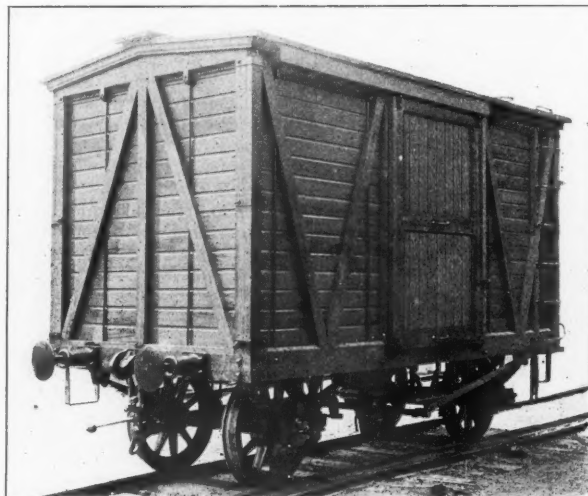
365. Whenever it is necessary to discontinue the use of any fixed signal, the division superintendent and the supervisor of signals must be notified by telegraph.

ENGLISH RULES.

In the clearing house rules governing the disconnection of facing switches, it is laid down that before any detector or detector bar, or any facing switch connection is interfered with, a memorandum must be given to the towerman by the signal fitter as to what is going to be done and this memorandum must be signed by the fitter and its receipt acknowledged in writing by the towerman. The distant signal applicable to the line affected must be fastened at danger by being disconnected from the lever in the machine, and a flagman must be stationed at the disconnected switches. The stop signal must be kept at danger by the towerman and not lowered until he has been assured by the flagman that the switches are lying in their proper position. When the work is completed the signal fitter and towerman exchange certificates and of course the towerman is to assure himself that all is in order before he puts his signature to such a document.

Covered Goods Wagons for Japanese Railways.

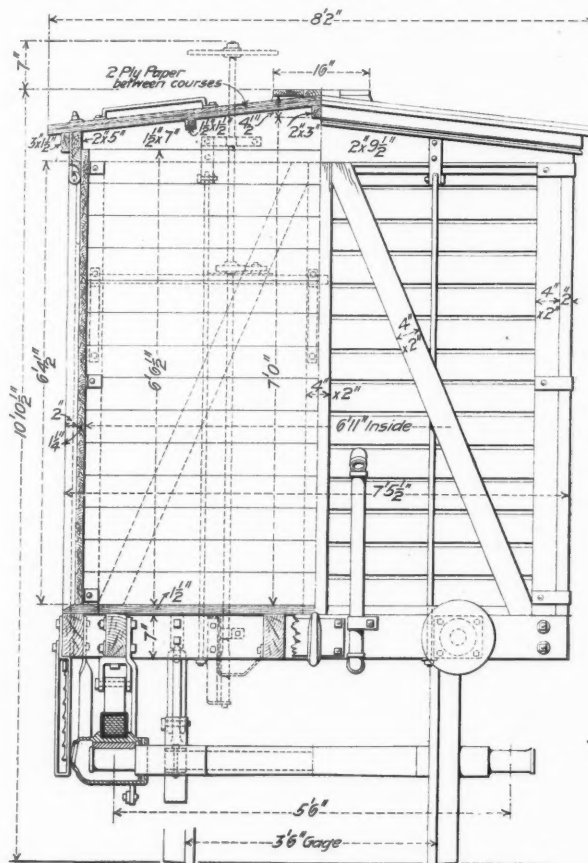
The Western Steel Car & Foundry Company, Chicago, is building for the Japanese Imperial Government Railways a lot of 900 narrow-gage (3 ft. 6 in.) covered goods wagons, illustrations of which are shown herewith. This is part of an order for 2,400 of these cars placed in this country, the remainder being built by the American Car & Foundry and the Middletown Car Works respectively. Their capacity is seven long tons (about 16,000 lbs.), and their weight 12,300 lbs. each. The car is a combination of American and European practice, the superstructure following the



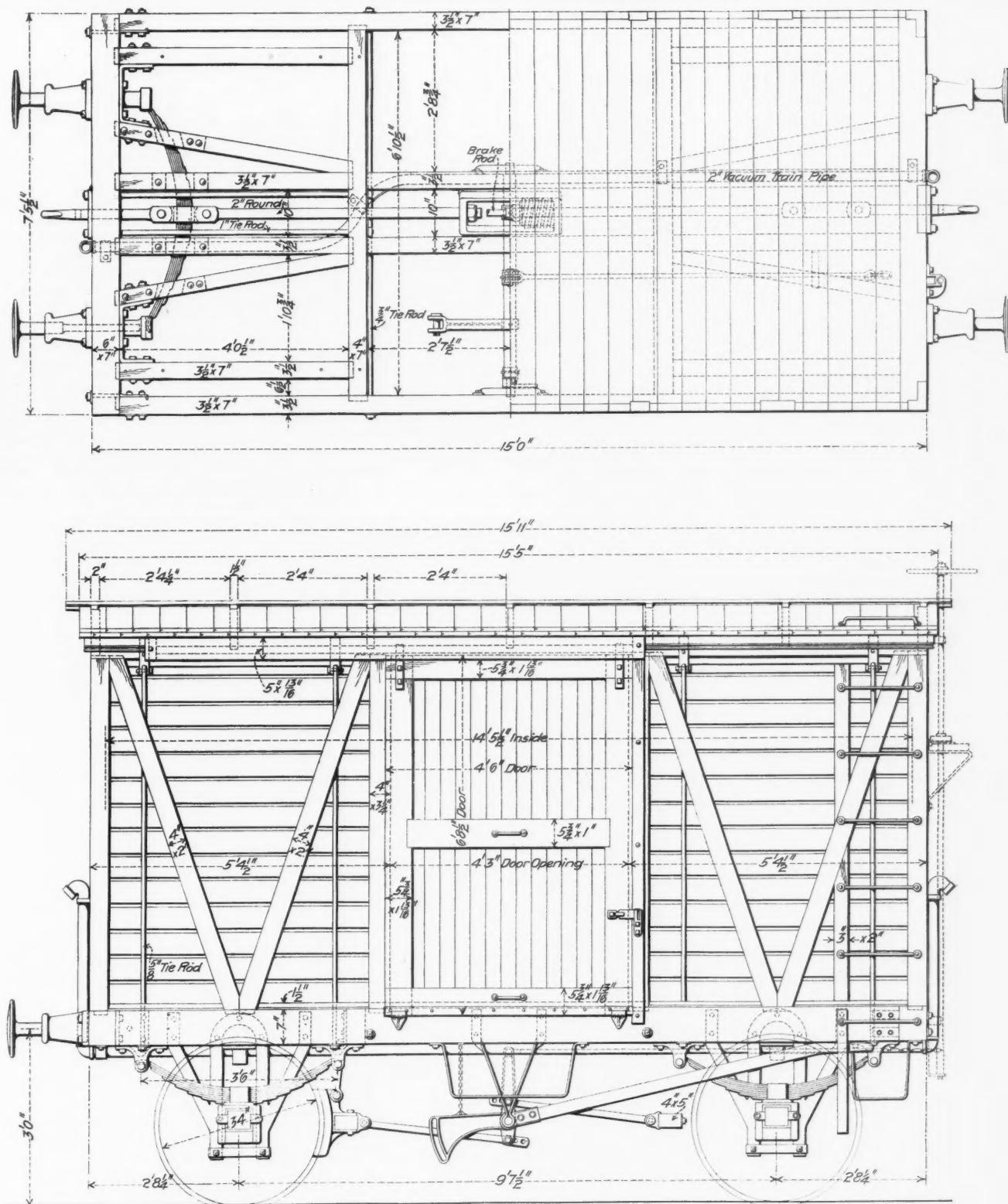
Covered Goods Wagon for Japanese Imperial Government Railways.

former, while the general characteristics are similar to the latter. Its length over end sills is 15 ft., width over side sills 7 ft. 5½ in., and height top of rail to top of running board is 10 ft. 10¾ in. The corresponding inside dimensions are 14 ft. 5½ in., 6 ft. 11 in. and 7 ft. respectively.

A special body construction is employed to enable the cars to



Part End Elevation and Cross-Section of Covered Goods Wagon.



Plan and Side Elevation of 16,000-lb Covered Goods Wagon for Japanese Imperial Government Railways.

be shipped conveniently, knocked down. The body can be separated into eight parts, not including the doors, composed of the roof, floor, ends, and two parts in each side. The whole is held together by the vertical rods seen in the half-tone view. By removing the nuts on the bottom ends of these rods under the side sills they may be loosened and the pins securing them to the eyes attached to the roof may be removed. The sides are further held together by straps at the corners. With the removal of these straps, all of the parts may be separated readily.

The cars are all equipped with a foot-power brake, the details of which may be seen from the drawings and the photograph. A long lever at the side of the car extends from one end to connect

with a transverse shaft hung below the middle of the car. Extending respectively above and below this shaft, in the same plane, are two short arms to which the brake rods are attached. The outer end of the operating lever passes through a guide secured to the side sill and extending downwardly therefrom. The inner side of this guide is a rack, enabling the lever to be retained in any desired position within the guide. The cars are also fitted for the application of the vacuum brake and are piped for connection with vacuum-braked cars. In addition, every tenth car is fitted with staff, wheel, etc., for hand braking. They will have draw-hook and screw couplings, wrought iron buffers, gray iron journal boxes, elliptic bearing springs and steel tired wheels.

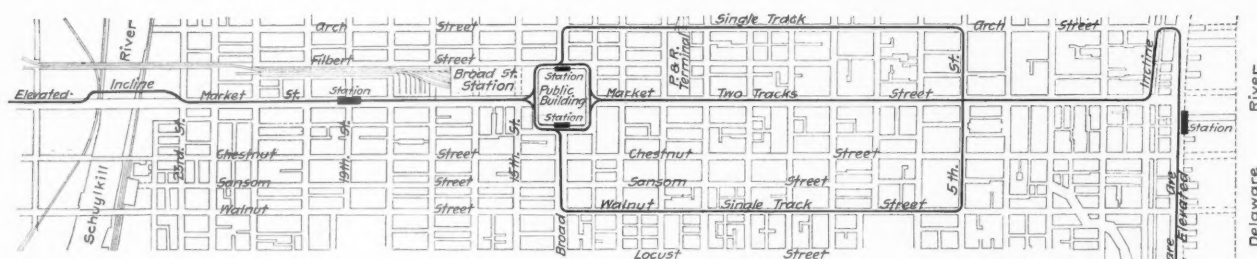
Philadelphia's Rapid Transit Railroad.

Philadelphia is characteristically a city of homes and covers an enormous area for its population. The Delaware river on the east prevents expansion in that direction and the city's growth has taken place largely to the west, north, northeast. With the newer outlying residential districts being rapidly built up, some form of rapid transit to and from the business center has become an absolute necessity. The introduction of electric traction in 1892 helped somewhat, but it was not long before the capacity of the surface lines laid on the narrow streets in the business district was taxed to the utmost, and some other measure of relief had to be looked to. Practically every street in the business district bounded by Delaware avenue, Arch, Tenth and Walnut streets is already occupied by surface lines, most of them single track loops carrying cars in one direction only on account of the narrowness of the streets and the congested vehicular traffic. Up to 1901 there was no law in the State of Pennsylvania under which an elevated or subway rapid transit railroad could obtain a valid charter and this undoubtedly hindered the development of any plans for relief of the congestion in Philadelphia. In the spring of that year, the so-called Focht-Emery bills were passed and almost immediately franchises were granted by Philadelphia Councils for five different rapid transit projects. These were the Ridge Avenue Elevated, the Frankford Avenue Elevated, the Passunk Avenue Elevated, the Germantown Avenue Elevated, the Broad Street Subway and the Market Street Elevated. In April another franchise was granted for a subway under Market street. All of these franchises were subsequently acquired by the Philadelphia Rapid Transit Company, which operates all of the surface lines, and a comprehensive scheme for real rapid transit

river. Contracts for both sections were let to the E. E. Smith Contracting Company, Philadelphia, on April 1, 1903, and the first ground was broken on April 6.

Before actual work could be begun on the subway it was necessary to arrange to change the location of the sewers under Market street between 15th street and the river and to build a new outfall into the river. The drainage through this part of the city is to the north and a new intercepting sewer was therefore built outside of the line of the south wall of the subway to take the sewage from the cross streets and the houses on the south side of Market street. To take care of the house drainage on the north side of Market street a small sewer was built in the north wall of the subway as the work progressed. The water and gas mains were moved outside the subway walls, pipe lines under cross streets being carried over the roof of the tunnel. The most difficult work of this kind was a 48-in. water main under 22d street which was carried over the roof, a special construction being employed here. Between 22d and 23d streets the subway passes close to large gas holders of the United Gas Improvement Company, and a complicated network of gas pipes was relocated here. The conduits of the Bell Telephone Company were taken up and relaid in Arch street one block north. Part of the conduits of the Keystone Telephone Company were laid in the upper part of the south wall of the subway and the remainder were relaid in the back filling along the north wall substantially in their former position.

When the rapid transit system was laid out a maximum grade of 5 per cent. was adopted. In order to preserve this maximum grade and bring the tracks up from the subway level to the established level of the bridge over the river it was necessary to raise the grade of Market street about 12 ft. between 22d street and the



Map of the Business District of Philadelphia Showing Route of the Rapid Transit Subway.

was outlined. It was decided to begin with the construction of the Market street elevated and subway line and to subsequently build and connect up the other lines for which franchises had been granted. West Philadelphia stood in the most urgent need of the better facilities which this line will give, and in the business district the congestion of traffic on Market street, the principal thoroughfare, will be greatly relieved.

The plan proposed for the Market street line which is now building was an adaptation of Boston's rapid transit scheme and provided for elevated trains and surface cars. The Market street franchises gave the right to build both an elevated structure and a subway. Accordingly the line was laid out for a double track elevated road on Market street from a point 700 ft. west of the county line near 63d street in West Philadelphia to the west bank of the Schuylkill river, the surface car tracks to be maintained underneath. A four-track bridge over the river carries the elevated and surface lines up to the portal of the subway section at 23d street. From this point to 15th street a four-track subway was planned, the two outside tracks carrying the surface cars and the inside tracks carrying the elevated trains. At 15th street the subway is to be divided, passing around the City Hall. The elevated train tracks will continue on around and join at Market street again to form a two-track subway to extend down to the river front, where the tracks will emerge on an incline to an elevated structure on Delaware avenue from Arch to South streets. The surface car track will leave the elevated train track at Broad street and the City Hall and continue south on Broad street in a single track subway to Walnut street, then east to Fifth street, north to Arch street, west to Broad street and south to City Hall, where it completes the loop and joins the westbound elevated train track to continue on out under Market street. These lines will reach the heart of the business and wholesale district, the Pennsylvania's Broad street station, the Philadelphia & Reading terminal at 12th and Market streets, and the Camden ferries at the foot of Market street.

MARKET STREET SUBWAY.

Work was begun first on the subway section between the Schuylkill river and 15th street. For the purpose of letting the contract this section was divided into two parts, section three including the work from the west house line of 15th street to the west house line of 22d street, and section four beginning at the west house line of 22d street and including the east abutment of the bridge over the

river. This work, including the changes of grade in adjacent streets, was authorized by a city ordinance passed Dec. 24, 1902. The contract was let by the city to C. P. Weaver, and afterwards sublet to the E. E. Smith Contracting Company, contractors for the subway work. The old grade of Market street was only 9 ft. above the established level of the base of rail in the subway and the approach to the Market street bridge was quite steep. Concrete retaining walls were built on both sides of Market street next to the property line and the excavated material from the subway was used for filling in. The south half of the street was filled in first and the street car tracks and roadway shifted to that side, while the north half was being filled in and the subway and portal built.

The total length of the tunnel in sections 3 and 4 is about 3,700 ft. It is four-track throughout and is a tangent for the entire distance except for the reverse curve beginning 77 ft. west of the center line of 22d street, which deflects the tracks out 100 ft. to the north to the center line of the bridge over the Schuylkill. The portal is 150 ft. west of the center line of 23d street. A typical cross-section of the subway is shown in one of the drawings. Market street is practically level between 15th and 23d streets and the floor of the tunnel corresponds nearly to the street grade. The minimum cover above the top of the roof is 4 ft. and the maximum about 9 ft.

The side walls are concrete of a 1:3:6 mixture, reinforced with horizontal and vertical rods bedded 3½ in. from the inside face of the wall. The horizontal rods are deformed rounds ¾ in. in diameter and spaced 18 in. apart beginning from below the base of rail and extending up just under the bed plates for the roof beams. In the early part of the work 1½-in. Thacher rods, 17 ft. 6 in. long and spaced 15 in. center to center, were used for the vertical reinforcement in both walls, when it was intended to build ducts in both walls, but later this detail was changed so as to use 1-in. Thacher rods spaced 15 in. center to center in the north wall, where the ducts were omitted, and 12 in. center to center in the south wall, where the ducts were retained. The walls are the same thickness, 42½ in., from top to bottom, being given no batter.

The floor is concrete of a 1:3:6 mixture with a minimum thickness under the ballast of 11 in. on an earth foundation and 6 in. on a rock foundation. It is formed with suitable benches for supporting the roof columns. These columns, which are made up in an I-

section of four 4-in. x 3-in. x $\frac{3}{8}$ -in. angles and a 6-in. x $\frac{1}{4}$ -in. web plate, are spaced 5 ft. center to center. They rest on base plates 16 in. x 14 $\frac{1}{4}$ in., and support the roof beams with 9-in. x 14-in. cap plates. At cross-overs and on the reverse curve west of 22d street, concrete bulkheads or fenders will be built in the rows of columns as shown in the drawing, a passageway being left between every other column, which also serves as a refuge bay for workmen. These bulkheads will be 4 ft. 5 $\frac{1}{2}$ in. high, and will be reinforced with $\frac{3}{4}$ -in. round rods. Where the bulkheads are not used, a reinforced concrete strut is placed longitudinally about the middle of the column.

The roof is the same arch construction as was extensively used in the New York subway. The roof beams are 20-in. I-beams, 65 lbs. per ft. bedded on 12-in. x 12 $\frac{1}{2}$ -in. x $\frac{3}{4}$ -in. bearing plates in the side walls and supported by the central columns. They are completely encased by the concrete arches except the bottoms of the lower flanges and are thus effectually protected from corrosion. The arches are made of a 1:3:6 mixture of concrete and have a minimum thickness under the waterproofing at the crown of 1 ft. 3 in. They are reinforced over the I-beams by a strip of wire mesh 20-in. wide and by $\frac{3}{4}$ -in. tie rods between the beams.

The roof loads assumed in the design of the roof and column members are in accordance with the results of long experience in Philadelphia and allow for the heaviest loads likely to be transported through the streets. The heaviest pavement liable to be placed—granite blocks on a 6-in. concrete base—was assumed, which gives a weight for 15 in. of depth, including a 3-in. sand cushion, of 175 lbs. per sq. ft. The weight of earth filling below the pavement was taken at 110 lbs. per cu. ft., giving a maximum dead load for a 10-ft. covering of 1,140 lbs. per sq. ft. The concentrated live load consists of 10 tons on each of four wheels, 20 ft. between axles on a 6 ft. gage. This is considered as evenly distributed over the roof by the pavement and the top filling. By assuming these wheel loads as replaced by rectangles spaced 20 ft. apart, the equivalent distributed load was found. This varies from 1,180 lbs. per sq. ft. for a 4-ft. cover to 200 lbs. for a 16-ft. cover though not in direct proportion to the depth. In addition to the foregoing concentrated loads, a general load of 200 lbs. per sq. ft. is applied exterior to a space 30 ft. long and 11 ft. wide, placed symmetrically to the concentrated load, the greater length parallel with the longitudinal axis of the latter.

In some places where the standard roof construction could not be employed special methods were used. At cross-overs, for example where the span of the roof beams is 24 ft., 30-in. plate girders are used instead of the 20-in. I-beams.

The waterproofing and means for keeping the subway dry have been given particular attention as part of the tunnel walls are below the level of water bearing gravel. In the side walls a layer of waterproofing is applied as follows: First, a layer of Cerion waterproofing compound over the concrete, then a layer of burlap, another layer of paint, another of burlap, and a third layer of paint. Eight inches of concrete is then put on outside of this coating before the back filling is put in. This layer of waterproof covering extends down to the level of the base of the rail and is made a continuous part of the roof waterproofing, which consists of rock asphalt mastic 1 in. thick applied in two layers. The specifications for this mastic are as follows:

The asphaltic rock forming the basis of the mastic shall be Seyssel, Limmer, Sicilian or Neuchatel, of the best quality and imported in the crude state. Such rock shall be prepared and manufactured with asphalt as a flux, to be composed of Bermudez or Alcatraz asphalt or a mixture of them, made into blocks, properly marked and branded. These blocks shall be broken up and melted on or in the immediate vicinity of the work and prepared for use by the admixture of materials, as stated in the following: The mixture shall consist of 70 parts by weight of the aforesaid asphaltic mastic as received in cakes or blocks, ten parts by weight of refined Bermudez or Alcatraz asphalt or a mixture of them, and 20 parts by weight of sharp grit and sand that will pass a sieve of eight meshes to the lineal inch, free from dust and dirt. As the mastic is melted, the grit and the asphalt, having been previously heated to the same temperature as the mastic, shall be added, and the whole mass heated to a temperature of 260 to 280 deg. F. and thoroughly mixed. After a sufficient time of boiling, the mastic is to be carried to the work in wooden pails or barrels and there carefully spread over the floor and roof with wooden spatulas to such a depth that after having received its ultimate compression it will have a thickness of not less than $\frac{1}{2}$ in. The mastic so applied shall be thoroughly worked until it is entirely free from voids and thoroughly compacted. Care shall be exercised so that the grit used shall be free from particles exceeding the size herein specified, and the surfaces well broomed and free from pebbles or any particles which will be rolled about in smoothing and compacting the mastic, and thereby produce defective spots in the covering.

All surfaces upon or against which waterproofing is to be placed must be dry and approved before waterproofing is applied. In particular situations apparatus for local application of heat shall be used if necessary to expedite drying of the surfaces.

The roof is given a slope each way from the center of 1 in. in 6 ft. and on top of the waterproofing an additional 3 in. of concrete is placed to protect the waterproofing from being punctured by the top filling.

Under the floor of each of the outside tracks a 12-in. terra cotta drain has been placed which dips to a common sump at 22d street. At intervals of 50 ft. branch drains 4 in. in diameter extend out under the floor beyond the side walls to collect the water in the soil back of the wall which would otherwise back up and leak through. A quarter-turn bend is placed at the end of these cross drains with the open end turned down and surrounded by broken stone to prevent the drains from choking up. A gutter in the floor of the subway leads any water which may collect inside the tunnel to gratings over the main drains, where it is run off. At 22d street two small centrifugal pumps, motor driven, with automatic float regulators, keep the water in the sump down to the prescribed level. This arrangement has proved very satisfactory, not only after the work was finished but in keeping the advance headings dry during construction. The drain is led ahead of the excavating and carries off most of the surface water. The waterproofing has been very effective for although the tunnel runs most of the distance in water bearing ground, the walls of the completed section are quite dry and in only one or two places can leakage be observed, and then only a small amount of water drips down.

There is only one station in the completed portion of the subway, at 19th street, although one will be built at 15th street when the work progresses that far down. The station at 19th street is for the surface cars only, running on the outside tracks. It has short platforms capable of accommodating about two cars at a time, or if desired three cars. On the south side there are two levels, the upper one having the ticket office and the lower one being at the level of the tracks for boarding and alighting from the cars. This double level was made necessary by the large sewer built along the south wall, which did not allow room for a ticket office and platform on the same level. The north platform is wider and allows the ticket office to be put on the lower level. Each platform has a separate exit and entrance and toilet rooms for men and women.

In building the subway the contractors made an effort to disturb traffic on Market street as little as possible. Work was begun on the west end after the necessary changes had been made in the street grades and sub-surface structures. The first step was to open the street on the south side and excavate a trench of sufficient width and depth to build the main sewer, subway wall and the foundations for the first row of columns. This was done in sections about two blocks long and one side of the street only was closed to traffic, the street car tracks not being disturbed. When the sewer and wall were built for the length of the section the first row of columns was put up and the roof beams, concrete arches and floor of the south track completed entirely. Then the trench was back filled and the top filling and pavement put down and restored to its original condition. Temporary shores were put in to relieve the wall from the earth pressure back of it until the remainder of the roof could be completed and the central core was bulkheaded at the same time. When this was completed the trench for the north wall was begun and carried up to the end of the south wall. After the wall had been built stringers were then placed under the street car rails, which rested on the central core, and a plank floor was laid on them. The pavement between the tracks was relaid on the plank floor and the whole was supported on temporary wooden posts until sufficient earth had been removed from under the floor to insert the roof beams on top of the standing columns. The floor was then lowered on blocking to the roof beams and the excavation of the central core begun. To facilitate the removal of the excavated material the roof next to the north wall was left off until the entire core was removed, when the roof arches over the remaining three tracks were placed and filled in on top. The street pavement was then restored to its original condition on a solid earth fill. The accompanying illustrations from photographs taken during progress of the work show these steps and also the comparatively unobstructed condition of the street.

The soil penetrated was firm clay and gravel with only an occasional outcrop of rock requiring very little blasting. No difficulty from caving was experienced and the work has progressed rapidly since it was fairly begun. The concrete used was all machine mixed and placed very wet. The surface next to the forms was well spaded and the result is a smooth uniform surface on the walls. The concrete work is an excellent example of good work placed under difficulties of accessibility. Gravel obtained from the excavation was used in much of the concrete in place of sand.

The conduits in the south wall are divided into two groups of 57 ducts and 21 ducts respectively. The top bank will contain the wires and cables of the Keystone Telephone Company and entrance to the manholes serving this group will be from the street surface. The lower bank of 57 ducts will carry the telephone, power and light wires of the Philadelphia Rapid Transit Company. The manholes for this bank open into the tunnel and also into the street. The ducts are 4 in. inside diameter, made of salt glazed vitrified clay and were laid in sections 18 in. and 24 in.



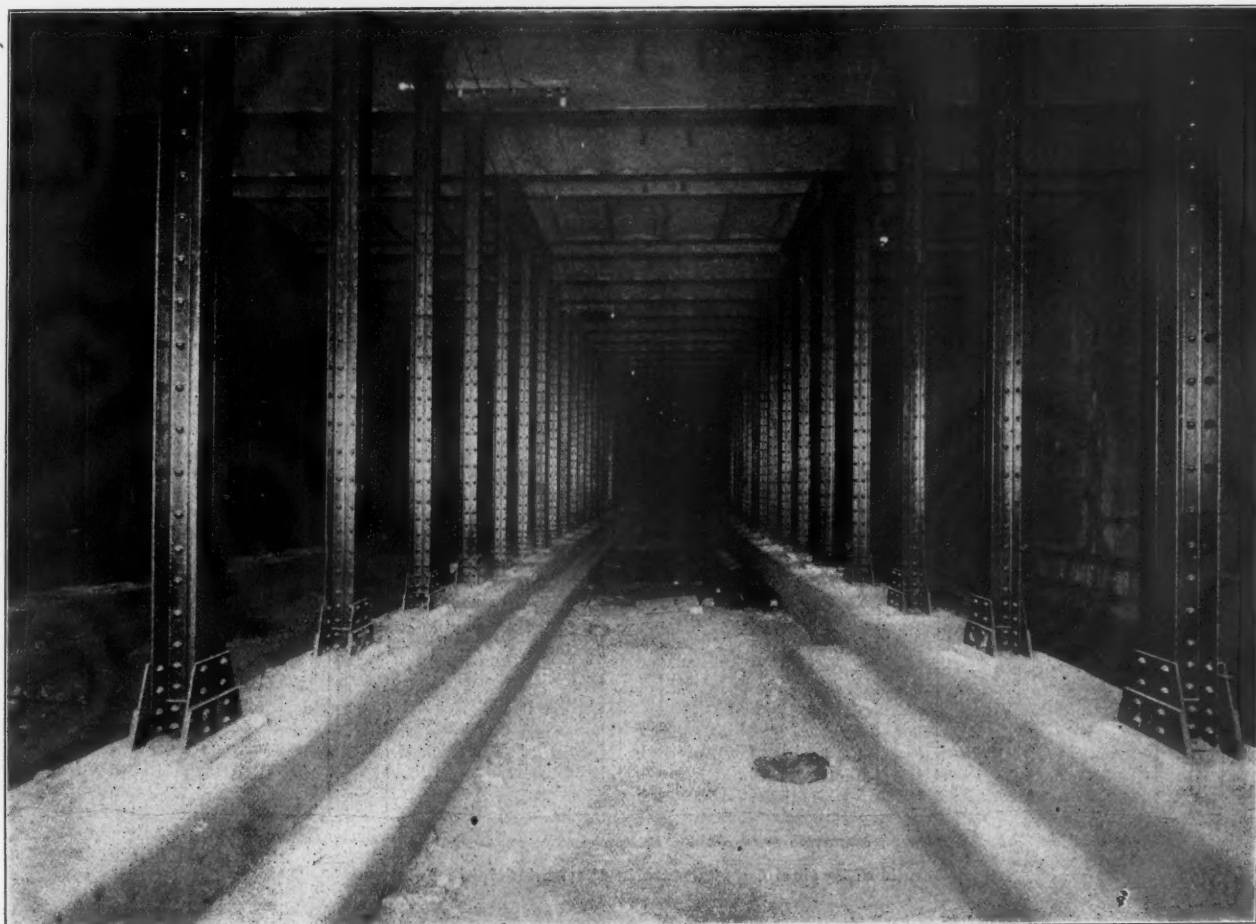
Market Street During the Construction of the Subway.



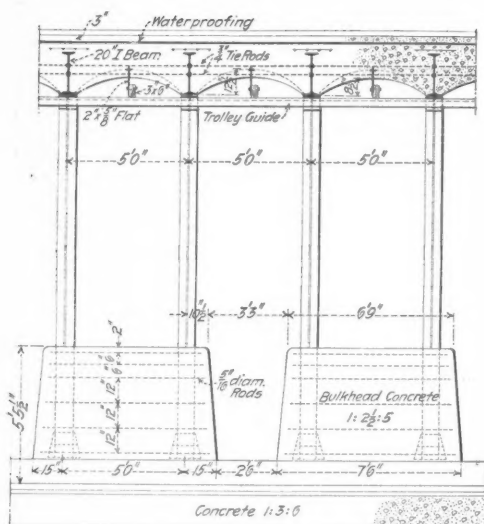
Roof Construction in the Subway.



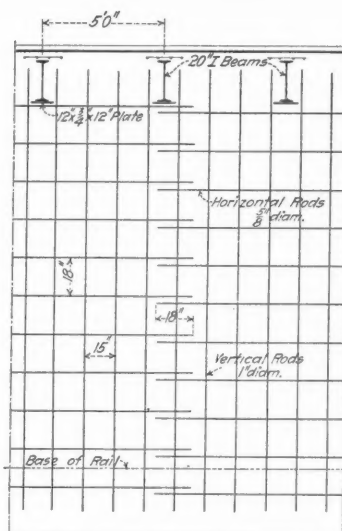
Placing Concrete Roof Arches at 23d Street.



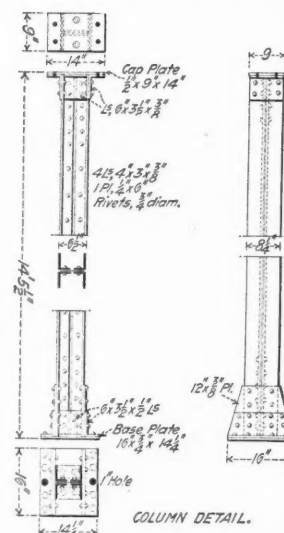
Completed Portion of the Subway Near the West Portal.



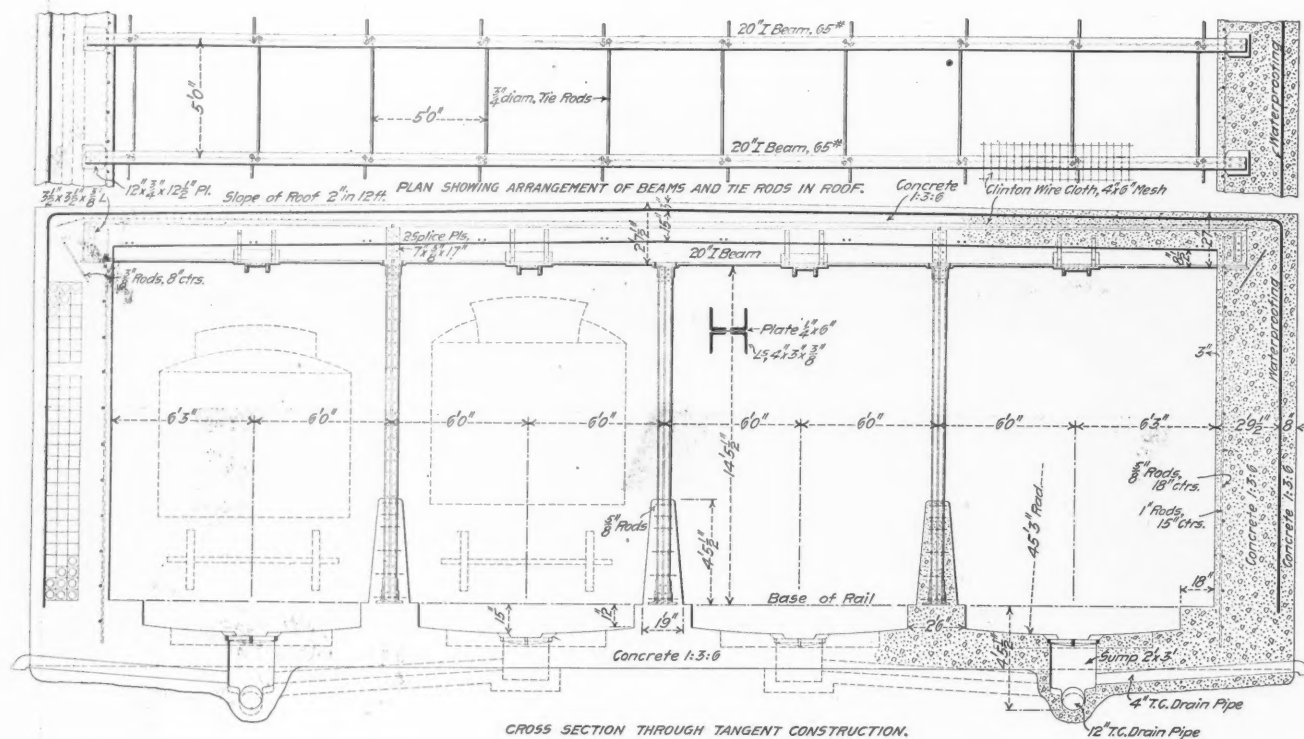
LONGITUDINAL SECTION SHOWING BULKHEADS.



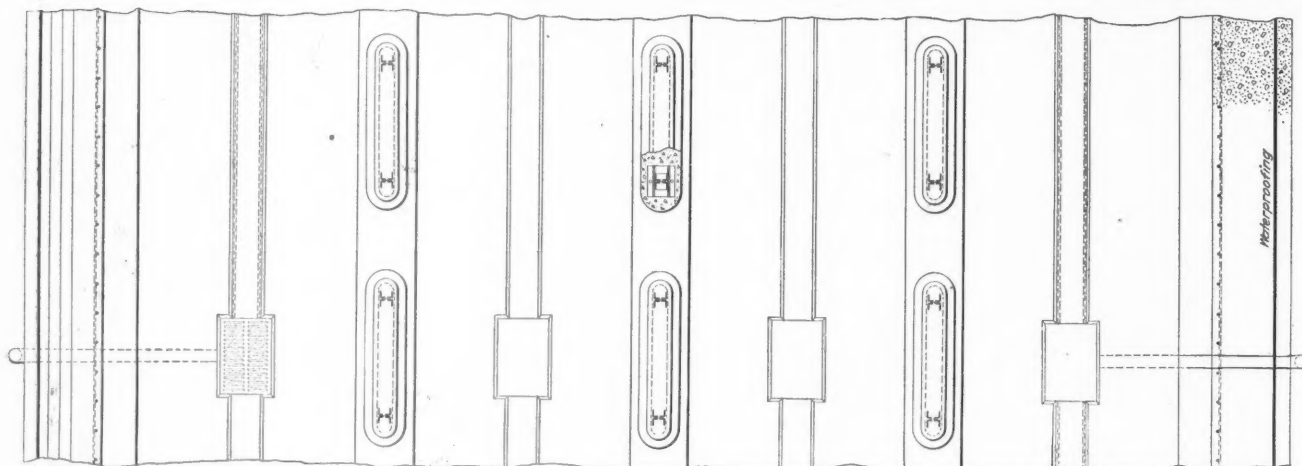
ELEVATION OF RODS IN SIDE WALLS.



COLUMN DETAIL.



CROSS SECTION THROUGH TANGENT CONSTRUCTION.



SECTIONAL PLAN SHOWING BULKHEADS AND FLOOR.

Details of Typical Construction in the Philadelphia Subway.

long. Particular care was taken to have them exactly coincide at the joints and to clean them of all projecting fins and mortar which might damage the cable covering. The joints are wrapped with two strips of thick muslin 6 in. wide and saturated with neat cement mortar to keep out water and dirt.

The track in the subway will be laid with 90-lb. T-rail. For the two middle tracks a third-rail will be installed, but trolley wire brackets have been fixed in the roof over all tracks, so that in case of emergency or for any reason it should be desired to run surface cars on the middle tracks means will be provided for delivering current through an overhead trolley. No attempt will be made to light the tunnel brilliantly and as yet it has not been finally decided whether the walls will be washed with a light colored water-paint or left in the natural color. The columns will be painted a dark color to relieve the eyes as much as possible. Whether a complete signal installation such as has been installed in the New York Subway will be put in has not yet been finally decided.

To assist ventilation four openings will be built near 15th street and two have been built at the 19th street station. These will provide room for fans driven by motors. At 22d street the foundations have been put in for an ornamental masonry ventilating stack 60 ft. which by natural draught will draw out foul air from the

from the station to the Baltimore & Ohio passenger station, one block away.

One of the illustrations from a photograph shows the bridge over the river. The superstructure consists of a plate girder approach span at the east end on which the station is built, a 98-ft. through Pratt truss, a 214-ft. truss with curved top chords, a 90-ft. Pratt truss and plate girder approach spans 82 ft. long on the west end. The design of the bridge involved considerable difficulty in placing the floor members and lateral bracing because the inside tracks for elevated trains are carried up on a 4.3 per cent. grade from the east shore pier so that at the west end they are on a level with the elevated structure which begins there, while the outside tracks are on a descending grade of 2.34 per cent. from the east river pier to the ground surface at the west end of the bridge. The design was further complicated by the fact that the west approach is also on a reverse curve having the point of tangency about over the west shore pier.

The east Pratt truss is a through truss with heavy floor-beams and stringers arranged in the usual manner. It is 22 ft. high from center of bottom chord to center of top chord. The 214-ft. span also has through trusses, but at the west end the inside tracks are raised so high that the portal is moved back to the second panel point. The west Pratt truss is practically a double deck structure,

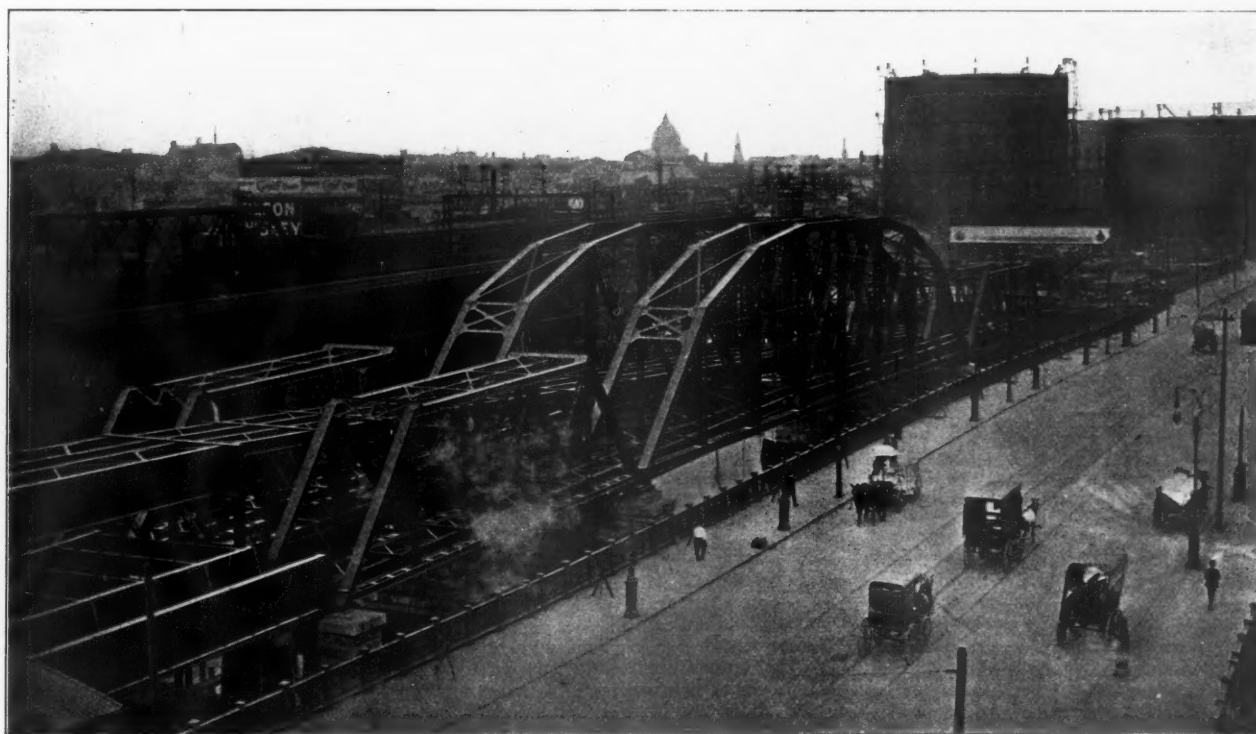


Photo courtesy Philadelphia Evening Bulletin.

The Schuylkill River Bridge of the Philadelphia Rapid Transit Railroad.

tunnel and discharge it above the house tops.

The present progress of the work is about as follows: The subway is completed from the portal west of 23d street east to a point about under 17th street. The south wall is completed to the end of the section at 15th street, and most of the remaining section of the north wall is done. The roof and excavation for the central core remains yet to be finished and there is much finishing work to be done on the 19th street station. No track has yet been laid but in the completed portion of the tunnel the floor has been cleaned to receive the track and part of the rails have been delivered along the track ready to be laid.

SCHUYLKILL RIVER BRIDGE.

The four tracks emerge from the tunnel portal west of 23d street on a $4\frac{1}{2}$ per cent. grade and with a spiraled reverse curve running on a solid fill close to the north retaining wall of Market street up to the east abutment of the bridge about 350 ft. west of the portal. A station for local cars is built between the first pier and the abutment having covered platforms about 90 ft. long. This span of the bridge carries the tracks over the tracks of the Baltimore & Ohio which run along the river's edge and is made up of four deck plate girders, with separate girders outside to carry the platforms. The four tracks on this span rise on a 4.63 per cent. grade to the first through span. The ties rest on stringers under each rail and these are supported on heavy floor beams. The abutment is built with a cross tunnel inside of the face. Stairways lead down from each platform to the level of the tunnel to furnish a connection

the elevated tracks emerging almost at the level of the top chord. The piers and abutments are all stone and with the exception of the west abutment rest on solid rock foundations put down with pneumatic caissons. The west abutment rests on a pile foundation. The total length of the bridge from the east abutment to the west abutment is 563 ft., and the under clearance at mean high water is 28.6 ft. The American Bridge Company built and erected the superstructure.

We are indebted to Mr. W. S. Twining, Chief Engineer of the Philadelphia Rapid Transit Company; Mr. Charles M. Mills, Principal Assistant Engineer in charge of subway and elevated improvements, and Mr. Frank Fisher, Assistant Engineer in the field, for information and the illustrations. In a subsequent article the elevated structure on West Market street will be illustrated and described.

(To be continued.)

The Swiss legislative bodies have been discussing the report and accounts of the state railroads for the year 1904, when there was an increase of working expenses much larger than the increase in earnings, due chiefly to an increase in payments to employees and some additional train service. The responsible officers report that the full effect of the increase in the number and wages of employees will not be felt till 1906; and that a conservative course must be pursued as to popular demands for additional trains, new structures, etc.; but that there is no cause for alarm, if such a

course is followed. They urge very strongly that the sinking fund policy, which will pay off the cost of the railroads in 60 years, be adhered to. Many suggestions were made in the legislature, but the prevailing feeling seemed to be one of satisfaction.

Criteria in Railroadings.

The time is close at hand for the annual harvest of railroad reports. In the next three months we shall have the usual statements covering the operations for the year ended June 30 last. Every year brings some improvement in the method of railroad reporting. Occasionally some company takes a step backward in the matter of furnishing information, but usually this is offset by improvement in other quarters.

Twelve or fifteen years ago the principal interest in railroad reports centered in the companies balance sheets. The all important point was that of "floating debt." At that time very little attention was given even by the more expert observers to anything beyond the condition of a road's finances. If a road's cash assets exceeded its current liabilities, and the official "income account" showed a surplus after all payments every one was satisfied. What might be called the "higher criticism" of railroad figures was then in its infancy. Later, as times improved, there came the study of "concealed equities" representing betterments charged directly in operating expenses diminishing the final surplus and superficially concealing the true earning capacity of the property. Expenses for maintenance of road and equipment began to receive close attention and the principal aim of those who study railroad reports was to develop the extent to which there was an equity in these expenditures. This was the principal criterion in the middle and later nineties.

Then came the question of operating efficiency as measured by the revenue train load. The principal impetus to this line of study was furnished by the advent of Mr. James J. Hill in Northern Pacific affairs in 1896. That Mr. Hill educated the financial district upon this point admits of no question. That he very largely educated the railroad world on the point is reasonably certain. At all events attention was focussed upon the matter to such good purpose that in a few years fully 100 tons was added to the average revenue train load of all the trains of the United States, although for many years previously little or nothing had been done in that direction. Study of the "train-load" question then directed people's minds to the importance of the "conducting transportation" expense-item which depends so largely and so directly upon train loads. In the last two or three years this has been the item in a railroad report which has received the most critical observation and according to which railroads have been judged. Of course the other criteria have not been neglected by any means, but, as is natural, each item in turn has had, so to speak, the center of the stage. The "conducting transportation" matter is, moreover, likely to hold the forefront for some little time to come as results for the past two years have been on the whole unsatisfactory from this point of view. The railroads, partly as a result of inefficient facilities, partly as a result of bad weather and partly as a result of careless operation owing to considerable prosperity, have fallen off in the matter of operating efficiency and the ground lost will have to be made up as a preliminary to further improvement.

Probably no single item in the railroad reports for the fiscal year recently ended will be of greater importance than this one. Probably the reports will show results not satisfactory. That there is at the present time a great margin for improvement so far as most of the large systems are concerned is quite certain. Because railroads are prosperous they need not necessarily be extravagant. —*Wall Street Journal*.

Investigation of Private Car Lines.

The Interstate Commerce Commission, on its own initiative, acting from complaints against private car lines, has begun a much needed investigation of the subject. Prior to any action that may be taken by Congress, next winter, it is desired to test the existing laws, and see if they provide workable remedies for the evils that undoubtedly exist.

The complaint set forth by the Commission is directed against the Armour Car Line, the American Refrigerator Transit Company, the Santa Fé Refrigerator Despatch, and the following railroads: St. Louis & San Francisco; Atchison, Topeka & Santa Fé; St. Louis, Iron Mountain & Southern; Central of Georgia; Southern; Atlantic Coast Line; Seaboard Air Line; Pennsylvania; Southern Pacific, and Kansas City Southern. The railroads and refrigerator lines are made respondent in proceedings which require that specific answer to all allegations be made to the Interstate Commerce Commission by September 5.

It is charged that by way of rebates or other devices the refrigerator lines are acting for the railroads as authorized agents and the railroads, acting through the refrigerator lines, are collect-

ing and receiving for the refrigeration of fruit and vegetables lower rates from some shippers than they are contemporaneously receiving for similar service rendered to other shippers. This is held to be in violation of sections two and three of the act to regulate interstate commerce.

Another charge is that failure and neglect to publish at shipping stations and file with the Interstate Commerce Commission the rates and charges imposed for refrigeration of fruits and vegetables, constitutes a violation of section six of the Interstate Commerce act.

The Commission alleges further that the charges published jointly by the refrigerator lines and the railroads for the refrigeration of fruits in certain specified territories are unreasonable and unjust, and in violation of section one. The territories described are Missouri, Arkansas, Indian Territory, Texas, California to eastern points, Louisville and Kansas, and Georgia, South Carolina, and North Carolina, to New York.

The Frisco System of Handling Time Freight.

The present time freight system of the Frisco, which went into effect March 1, 1905, is based on a telegraphic record of cars containing important or perishable commodities. Such commodities are divided into two classes. Perishable freight, carloads of package freight or merchandise, oils, etc., are designated as Red Ball freight. The second classification of goods, which take precedence over ordinary freight but not over the Red Ball group, is larger and includes new agricultural implements, ammunition, architectural iron, export cotton, canned goods, crockery, dried fruits and vegetables, machinery, furniture, etc. The commodities on this list are known as Green Ball freight. On June 1, 1902, a system was put into effect covering Red Ball shipments only. The forms that were used were practically the same as at present, except that movement of the cars was posted on a large board by symbols, and these symbols were moved along the board as fast as wire reports were received. This served very well for keeping track of the cars in transit, but did not give a permanent record which could be consulted easily later on; therefore, the board was done away with, and the movements of freight were recorded on loose record sheets. This system is still in effect and permits a permanent record to be maintained by which tracers can be answered days or weeks later. A Red Ball envelope was formerly used which carried the billing; but this caused inconvenience, extra work, and occasionally improper handling of cars through the bills being placed in the wrong envelope. The 1905 modification of the system has done away with the envelope at the same time that it introduced the Green Ball classification. Instead of the usual waybill, these shipments are covered by billing printed on red and green paper, and at large stations, such as St. Louis, Kansas City, etc., a red or green card waybill is used when the regular billing cannot be made out in time to accompany the car. One of these waybills is shown with this article. Merchandise billing is made out in the usual form, with a Red Ball card attached to the bundle or car when the bills are not ready at the time of forwarding. Freight from small points not designated Red and Green Ball billing stations is moved to the first division terminal in local trains, where it is assigned proper symbol letters and numbers and is placed in through trains.

The "consist" reports, as well as the passing and set-out reports, are explanatory, and are sent by wire promptly after passing each terminal. Examples of these reports are shown herewith. Only the original consist report gives the car number, waybill reference, etc. Thereafter the symbol is used exclusively. By this system the company is enabled to notify its traffic representatives promptly of shipments coming on or reaching various important terminals, such advice being sent either by mail or by wire as circumstances may require.

The Red Ball system is maintained in the office of the superintendent of car service and he is the only one authorized to trace carload shipments, an arrangement which has materially reduced wire work and duplicate tracing by different departments.

The pamphlet of instructions sent out at the time the present system was inaugurated last March specifies, among other things, that all tracing of carload freight shall be done through the superintendent of car service, and that tracing of less than carload freight shall be done through the freight claim agent. Less than carload shipments must not be traced by wire and tracers must not be started until sufficient time shall have elapsed for shipments to have reached destination and with positive information of non-arrival. Tracers received either by mail or wire must be answered promptly and not held awaiting arrival of shipment. All tracers from the superintendent of car service are covered by a file reference, and this file reference must always be quoted in answering tracers. Attention is called to the point that the principal object to be attained by the system is to eliminate all telegraphic tracing and also to relieve the freight claim agent's office of the burden of tracing by mail, and it is emphasized that success depends entirely on these tracers being handled without any delay whatever.

There are 66 stations at which Red and Green Ball freight can

be billed. Each of these stations has a symbol letter and is assigned numbers, extending from one to 30 in the case of the smallest stations, and from one to a thousand in the case of Kansas City and St. Louis. Other points range between these extremes. Each station uses its numbers consecutively, regardless of whether Red or Green Ball freight is covered, commencing with the lowest number and starting again with "one" when the highest number has been reached. Thus, Afton, symbol letter F N, numbers from one to 30; Memphis, symbol letter A U, numbers from one to 600.

Forms 142 and 142A are the Red and Green Ball cards to be attached one on each side of every car of freight thus designated

original accompanies the car and the tissue copy is mailed to the auditor of freight accounts at St. Louis.

The Red or Green Ball freight waybills (either regular or card) are not given symbol letters and numbers until all of the cars which are to be forwarded as Red or Green Ball freight are ready. The waybill covering the car for the nearest destination, either Red or Green Ball, should be given the opening symbol number, and the waybill for each succeeding destination should be given succeeding numbers consecutively in the same way.

Forms 106 and 106-A, differing only in size, are known as the consist report, and are used by the agents at Red and Green Ball

Form 106. **FRISCO SYSTEM** Movement of Red and Green Ball Freight. *July 1905* **FRISCO SYSTEM**

Train No. *10* Engine *#777* Out at *6 P. M.*

Symbol	Initial	Number	Contents	DESTINATION	ARRIVED	DEPART	ARRIVED	DEPART	ARRIVED	DEPART	ARRIVED	DEPART	ARRIVED	DEPART	ARRIVED	DEPART	ARRIVED	DEPART
10	LF	1150	Wheat	St. Louis	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05	10/10/05
11	—	1237	—	Van Buren	—	—	—	—	—	—	—	—	—	—	—	—	—	
12	RC	1150	—	St. Louis	—	—	—	—	—	—	—	—	—	—	—	—	—	
13	WAB	1102	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
14	RC	5091	Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
15	RC	1263	Beer	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
16	JM	5194	Wheat	Paris	—	—	—	—	—	—	—	—	—	—	—	—	—	

DN indicates Receiving Station. SP indicates Ship Station. Red ink notations indicate arrival at destination, or at junction point where shipment is delivered, connecting line.

MO. Springfield. MO. Chicago. MO. St. Louis. MO. St. Paul. MO. St. Joseph. MO. St. Charles. MO. St. Louis. MO. St. Paul. MO. St. Joseph. MO. St. Charles.

All cars in above train out of St. Louis noted through on schedule time. No "set out" or delay.

Portion of Page from Monthly Record.

by the agent at the billing station. The Green Ball form, not shown with this article, is precisely like the Red Ball form except that the legend on the bottom of the card reads "This car must not be delayed except on account of being in bad order or to give preference to Red Ball freight." It is marked on top "Green Ball Freight," and contains in its center a green disk 6 3/4 in. in diameter. From one to five trains are specified in each of the nine operating groups as Red Ball trains, and for convenience all of these trains in each group are designated and carded by a single train number, often given in an abbreviated form.

Form 1,171 or 1,172 must accompany each car of Red Ball freight. The accompanying waybill for Green Ball freight is not shown, being substantially the same. These forms can also be used as a through waybill when shipments are destined to points beyond the Frisco system and for which through rates are provided. The space provided for Red Ball symbol letters and numbers must be left blank by agents at non-Red Ball billing stations and filled in by the agent at the first Red Ball billing station en route. This waybill takes the place of the Red Ball freight envelope formerly used. It is specified in fine print in the lower right-hand corner of the waybill that conductors must refuse to handle the car beyond

billing stations to report by wire to the superintendent of car service the forwarding of all cars belonging to either of these classes. The report is made up from information given on the face of the Red or Green Ball waybills.

Set-out cars are handled with form 102, which is attached to the back of the Red or Green Ball freight waybill or card waybill whenever it is necessary that such cars be set out. This blank is gummed at the top, so that it can be fastened to the back of waybills. It is of distinctive color and indicates to every one that the car has been set out and must not again be set out except on account of bad order. A duplicate of this report is left by the

Form 103.

FRISCO SYSTEM**Report of Arrival.****Destination.**

Sending Operator.	Receiving Operator.	Time Filed.	Time Sent.
		M	M

25 REPORT.

SUP'T. CAR SERVICE, From "A" *SPRINGFIELD.*

Date, "B" *19*

Freight with Way-Bills carrying following Symbol Letters and Numbers arrived at this station at time and date given below:

Symbol Letters and Numbers.		Arrival this Station.		
Lowest No.	Highest No.	Train No.	Time.	Date.
"C"	"D"	"F"	"H"	"J"

Agent or Yardmaster.

INSTRUCTIONS: Agents or Yardmasters at destination of car will make out this report immediately on arrival of cars of "Red and Green Ball Freight" traveling under symbol letters and numbers, and telegraph it to Supt. Car Service. Agents at junction points where cars leave this Company's rail, or at junction points with any branch line who receive any cars being handled as Red and Green Ball, will make out this report showing arrival of all such cars at their station.

In making up this report use the lowest and highest symbol number with letters shown on the "Red and Green Ball Freight" Way-bills. Make separate entries when break occurs in consecutive order.

the first Red Ball billing station en route unless it bears the proper station symbol letters and numbers.

Form 1,173 Red Ball card waybill is used by agents at large billing points for purposes of forwarding Red Ball freight when the regular Red Ball freight waybill cannot be made out in time to accompany the car. This form and the accompanying one for Green Ball freight, No. 1,175, are also used at junctions with other lines for purposes of forwarding Red and Green Ball freight received from connections under through waybill. These card waybills can only be used at points authorized by the auditor of freight accounts. It is prescribed that these forms must be copied, The

conductor with the telegraph operator at the point where the car is set out, and he at once wires the information given thereon to the superintendent of car service. If the car is set out at a blind siding, report will be left at the next telegraph station. Should the freight be transferred to another car the necessary information will be entered on the Red or Green Ball waybill in the proper place, but no change is permitted in the original symbol letters and numbers, which must identify the shipment to its destination.

Form 104, known as the delayed cars forward report, is used by all agents and yardmasters to report by wire to the superintendent of car service the forwarding of all cars of Red or Green

Form 142. **FRISCO SYSTEM** **RED BALL FREIGHT** THIS CAR MUST BE KEPT IN

TRAIN *10*

CARDING STATION *SPRINGFIELD*

CAR INITIAL *LF* NO. *1150*

DATE CARDED *10/10/05*

DESTINATION *St. Louis*

WEIGHT OF CAR AND LOAD

THIS CAR MUST NOT BE DELAYED EXCEPT ON ACCOUNT OF BEING IN BAD ORDER.

Red Ball Time Freight Card.

FRISCO
SYSTEM

Leave this Space Blank for Billing Purposes

FRISCO
SYSTEM

FORM 1171

This form to be used for billing RED BALL Freight ONLY

SEE CLASSIFICATION IN BOOK OF INSTRUCTIONS.

St. Louis and San Francisco Railroad Company

FROM _____ TO _____ DATE _____ 190____

ROUTE	VIA JUNCTION	VIA JUNCTION	VIA JUNCTION	VIA JUNCTION	VIA JUNCTION
	WITH	WITH	WITH	WITH	WITH
	R.Y.	R.Y.	R.Y.	R.Y.	R.Y.

Weigh this Car at _____ Marked Capacity of Car _____ lbs.
 Stop this Car at _____ For _____

Gross, Tare, and Net
 Weight of Carload Freight
 to be entered in this Space,
 where the Car is Weighed.

This space to be used at RED
 BALL billing stations only.
 Connecting Lines not interested.

RED BALL { SYMBOL LETTERS
 { SYMBOL NO.

WAY-BILL { SERIES
 { No.

CAR No. _____ CAR INT. _____

TRANSFERRED INTO

INT. No. _____ AT _____

INT. No. _____ AT _____

*WHEN A THROUGH RATE IS USED AND THE SHIPMENT IS TO BE RE-WAY-BILLED EN ROUTE, THE SUBDIVISIONS MUST BE SHOWN IN THE RATE
 COLUMN IN ROAD ORDER, NOTING OPPOSITE EACH PROPORTION THE INITIAL OF THE ROAD TO WHICH IT ACCRUES.

CONSIGNOR Connecting Line Reference, Original Car and Way-bill Number and Point Shipment.	MARKS, CONSIGNEE AND DESTINATION.	No. of Pags.	ARTICLES AND CLASSIFICATION Conditions (O. R., O. R., Rel., Gtd., Etc.	WEIGHT	Rate and Author.	FREIGHT	ADVANCES	LOCAL PREPAID	TOTAL TO PAY	PREPAY CONNECT'G LINE

AGENTS AT JUNCTION STATIONS RECEIVING THIS WAY-BILL FROM CONNECTING LINE MUST STAMP IN THE SPACES BELOW, IN CONSECUTIVE ORDER,
 THE NAMES OF THEIR STATIONS AND DATE UPON WHICH WAY-BILL IS RECEIVED.

1	2	3	4	5	Conductors must enter in space provided on back of this Blank number of train, station taken from and left at, date and signature. Read the instructions on back.	Conductors will refuse to handle car covered by this Way-bill be- yond first RED BALL billing sta- tion en route, unless it bears proper station symbol letters and numbers. This rule will be strictly enforced.
Stamp of Junction Forwarding Agent.	Stamp of Junction Forwarding Agent.	Stamp of Junction Forwarding Agent.	Stamp of Junction Forwarding Agent.	Stamp of Junction Forwarding Agent.		

NOTE.—AGENTS AT NON-RED BALL BILLING STATIONS WILL LEAVE SPACE FOR STATION SYMBOL LETTERS AND NUMBERS BLANK, TO BE FILLED IN AT
 FIRST RED BALL STATION EN ROUTE.

Form 104.

FRISCO
SYSTEM

DELAYED CARS FORWARDED

This report to be used when forwarding any cars
 loaded with Red and Green Ball freight which has
 been delayed from any cause.

Sending Operator.	Receiving Operator.	Time Filed	Time Sent
		M.	M.

24 REPORT "B"

From "A" _____ Date _____

SUPERINTENDENT CAR SERVICE, Springfield.

The following cars loaded with Red and Green
 Ball freight which have been delayed at this Sta-
 tion, went forward this date.

Train "C" _____ Engine "D" _____

Time Forwarded "F" _____ M.

Signature "C" _____

Position "H" _____

SYMBOL LETTER AND NO.		SYMBOL LETTER AND NO.	
From	To	From	To
"J"	"K"	"J"	"K"

INSTRUCTIONS.—This form will be used by
 Agents and Yardmasters to report the forwarding
 of cars loaded with Red and Green Ball freight
 which have been delayed at any station on any ac-
 count. Operators must give this report best possi-
 ble service, using symbols in transmitting.

Form 101.

FRISCO
SYSTEM

PASSING REPORT—"52" REPORT

Sending Operator.	Receiving Operator.	Time Filed	Time Sent
		M.	M.

SUPT. CAR SERVICE, From "A" _____
 Date "B" _____ 190

Freight with Way-Bills carrying following Sym-
 bol Letters and Numbers passed this Station as
 shown below:

Symbol Letter and Numbers.		Movement.			
Lowest No.	Highest No.	Arrived		Left	
		Train	Time	Train	Time
"C"	"D"	No.	"H"	No.	"M"
		"F"	"J"		

Cause of Delays "K" _____

Agent or Yardmaster. _____

INSTRUCTIONS.—This report to be made by
 Agents or Yardmasters at designated stations and
 telegraphed to Superintendent Car Service immedi-
 ately after the cars have departed. In making up
 the report use the lowest and highest symbol num-
 bers with letter shown on the "Red and Green Ball
 Freight" Way-Bills. Make separate entries when
 break occurs in consecutive order.

Form 102.

FRISCO
SYSTEM

SET OUT REPORT

This report to be used at points where more than
 one car of Red and Green Ball Freight is set out
 for any reason.

Sending Operator.	Receiving Operator.	Time Filed	Time Sent
		M.	M.

21 REPORT "B"

From "A" _____ Date _____ 190

SUPT. CAR SERVICE, Springfield.

The following cars loaded with RED AND
 GREEN BALL freight have been set out at this
 station:

Symbol Letter and No. as shown on Red Envelope		By Train	ON ACCOUNT OF (Give here exact cause for each car set out.)
From Lowest No.	To Highest No.	No.	
"C"	"D"	"F"	"K"


Signed _____ Position. _____

This form will be used to report set out cars con-
 taining Red and Green Ball freight when more
 than one car is set out. When one car is set out
 use regular Set Out Card. Give Symbol Letter and
 Number only when referring to these cars on this
 report.
 Train Symbol is shown on face of Red and Green
 Ball freight Way-Bills.

FORM 1171 (Back)

INSTRUCTIONS

AGENTS:—When this form of Way-bill is used in billing to points off this line, be particular to enter the proper serial letters and write the name of the station at which the freight will leave this road, also the name of the road on which the station billed to is located, on the blank lines provided on the face of Way-bill. In column headed "Authority" you will note the number of Special Rate, number of Special Order or Tariff, as the case may be. Agents are in no case to make a Way-bill to cover more than ONE CAR. A Way-bill MUST be made for EACH AND EVERY CAR. When billing carloads from a station having no track scales, agents must enter on the face of Way-bill the name of station at which the car is to be weighed.

Immediately upon receipt of Way-bill the Receiving Agent must enter date received, using his station dating stamp. 

CONDUCTOR'S RECORD

No. of Train	STATION NUMBER		DATE	CONDUCTOR
	Taken from	Left at		

CONDUCTORS must enter above the number of train, the station taken from and left at, the date, sign their names in the blank space provided, note particulars of transfer from one car to another, where, when and why transferred, also enter new car number and initials on both face and back of Way-bill, and any general information.

INSTRUCTIONS**IMPORTANT READ THIS**

Agents will use this Form to cover all carload shipments forwarded from their station coming under the classification as RED BALL Freight, as show in Book of Instructions. The freight covered by this Way-bill must be given preference over all GREEN BALL Freight and all ordinary freight.

This Way-bill must bear the proper station symbol letters and number before car, which it covers, is forwarded from a RED BALL billing station. Conductors will refuse to handle the car which it covers until this information is shown in space provided.

The freight covered by this Way-bill must not be delayed except on account of bad order.

After it has been delayed once, great care must be taken to see that it is not again delayed on route.

Whenever it becomes necessary to set out this car on ANY ACCOUNT, conductor or yardmaster must securely attach hereto a "Set Out Car" Report, Form 102.

Form 1175.

FRISCO SYSTEM**GREEN BALL FREIGHT.**

Card Way-Bill No.

Initials Car No.

Way-Bill Reference.

Transferred Car No.

At Date 190

From Date 190

To 190

Final Destination R. R

Routing R. R

Contents R. R

Consignee R. R

Consignor Weigh at R. R

Stop Car at For R. R

Forwarding Green Ball R. R

Station Symbol Letters R. R

Forwarding Green Ball R. R

Station Symbol Number R. R

WEIGHT. Agent will enter on blank lines below any SPECIAL INSTRUCTIONS following Car.

Weighed at R. R

Gross R. R

Tare R. R

Net R. R

INSTRUCTIONS. (IMPORTANT—READ THIS)

When authorized by Auditor Freight Accounts, agents will use this form as a Card Way-Bill for loaded cars when regular Way-Bill cannot be made in time.

Green Ball Freight must be given preference over all ordinary freight.

Each Card Way-Bill of this form must bear the proper Green Ball symbol letters and number before car is forwarded. Conductors will refuse to handle the car which it covers until this information is shown in space provided.

The freight covered by this Card Way-Bill must not be delayed except on account of bad order, or when found necessary to move Red Ball freight, which must always be given preference.

Whenever it becomes necessary to set out this car on any account, conductors or yardmaster must securely attach hereto "Set Out Car" report, Form 102.

If car covered by this Card Way-Bill is track scaled in transit, gross, tare and net weight, and point where weighed, must be entered in proper space above.

Agent at destination or at junction, if regular Way-Bill is made to point beyond our rails, must transfer the weight to the regular Way-Bill.

Form 1175 (Back).

RECORD OF MOVEMENT.

No. of TRAIN	STATION No.		DATE	CONDUCTOR
	Taken from	Left at		

Conductors must enter, in space provided, number of train, station taken from and left at, date and signature.

INSTRUCTIONS.

When Green Ball freight is received from connecting lines at our various junction points, under foreign Way-Bills billed to points on our rails and beyond, agent at such junction will fill out one copy of this form and securely attach same to the through Way-Bill. All necessary information called for by this form must be filled out by forwarding agent, and a consist report, Form 100, made to cover.

In case Green Ball freight is received from connecting line at a point not a Green Ball billing station, the car will be moved under regular Way-Bill as received from connecting line and Green Ball billing applied at first Green Ball station en route.

Agent at destination or point where car leaves our rails, will file this Green Ball Card Way-Bill for future reference.

See Book of Instructions for other information.

Form 102.

FRISCO SYSTEM**SET OUT CAR.****21 REPORT. "B"**

To From Station "A" Date "B"

SUPT. CAR SERVICE, SPRINGFIELD.

Car bearing Symbol "C" "C"

Set out at "D" "D"

By Train No. "F" "F"

On account of "K" "K"

..... Position or title.

INSTRUCTIONS. IMPORTANT—READ THIS.

If for any cause a car loaded with Red or Green Ball freight is set out, one of these "Set Out Car" forms must be properly filled out by the Conductor when car is set out between terminals and attached securely to the face of the Way-bills for this car. This form must remain with proper Way-bill until it reaches destination.

Conductors must leave these "Set Out Car" forms with Telegraph Operator who will telegraph above information to Superintendent Car Service, Springfield, and then turn this form attached to regular Way-Bill or Card-Bill over to proper party.

This car must not again be delayed except account Bad Order. Yardmasters and Conductors must see that this rule is absolutely enforced.

Yardmasters who take cars of Red or Green Ball freight out of its regular train for ANY cause and hold them for another train, thereby forcing a delay, must attach one of these "Set Out Car" reports properly filled out to the Way-bill for each car so delayed and make proper report of it to Superintendent Car Service on form 100.

Operators will use Symbol Letters shown hereon in transmitting this report.

Form 106-A.

FRISCO SYSTEM

1-1905-50 M-C

CONSIST 23 REPORT

Sending Opr.	Receiving Opr.	Time filed	Time sent

From Station "A" Date "B" 19

SUPERINTENDENT CAR SERVICE, SPRINGFIELD.

Following Cars RED AND GREEN BALL freight left this station on

Train No. "C" Engine No. "F" Departed at "G" M.

Symbol Letter and Number	CAR		CONTENTS	CONSIGNEE	DESTINATION	If final destination is to point beyond our line, give Junction point where it leaves our line Routing beyond	
	Initials	No.					
"H"	"J"	"K"	"M"	"N"	"Q"	"R"	"S"

INSTRUCTIONS.—This Consist Report to be made up from information shown on face of Red or Green Ball Way-bills before each train handling Red or Green Ball freight leaves the station, and to show only such cars as are handled as Red or Green Ball. Operator must telegraph this report within one hour after train has left station.

Ball freight which have been delayed. This form is also used by yardmasters in reporting the forwarding of such cars, delayed by any cause, when not sent out in the proper train. The passing report, form 101, is used only by agents or yardmasters at a small number of important stations, and is a progress report for the information of the superintendent of car service. The final report, form 103, is used by all agents in reporting arrival of cars at destination.

It is provided that local merchandise traveling as Red Ball freight shall be red balled to the last district terminal reached before distribution begins, after which the car travels on local trains. These cars are handled on form 1,173. Less than carload shipments may be waybilled on Red Ball freight waybill form 1,171 or 1,172, but no symbol letters and numbers must be used on such waybill. It is specially provided that Red Ball freight must be handled only on trains designated or covered by special instructions, and that all Red Ball freight must be bunched as far as possible at district terminals for movement in such trains; these trains to be filled out with Green Ball freight. Cars containing freight other than the commodities given in the book of instructions must not be billed on the special classified waybills without permission from the office of the superintendent of car service. The diversion of all loaded cars in transit is handled through the office of the freight claim agent, and whenever a car is diverted the agent making the diversion shall notify the freight claim agent jointly with the superintendent of car service, by wire, giving new consignee, destination and routing. The general monthly report of the movement of this freight is shown on form 108, in abbreviated form.

The Air-Brake Law.

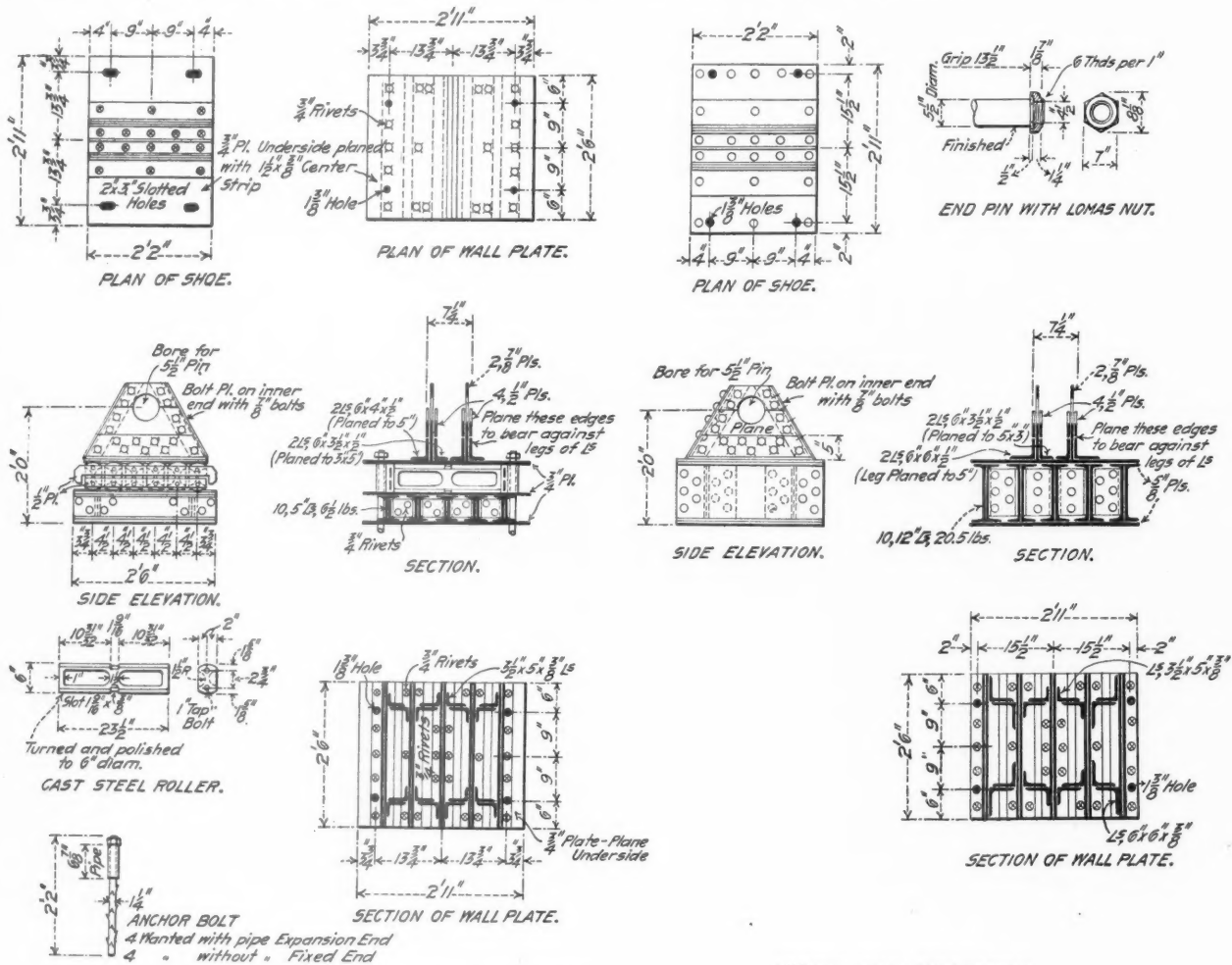
The Interstate Commerce Commission, acting under the authority vested in it by the law of March 2, 1903, proposes to make a change in the requirement that there shall be a certain percentage of air-braked cars in all trains, increasing the minimum beyond the present 50 per cent., provided it shall prove reasonable and practicable to do so. As a preparatory measure, the Commis-

sion has called upon the railroads to report to it before October 1 the average percentage of air-braked cars used in [freight] trains during the past six months. The law empowers the commission, "to more fully carry into effect the objects" of the law, from time to time, after full hearing, to increase the minimum percentage of cars which must have power brakes in use. It is held that sufficient time has now elapsed to permit the railroads to make any necessary preparations. In the preamble of the present notice it is said that "it has been brought to the attention of the Commission that dangerous conditions frequently arise from the buckling of trains under emergency applications of air on trains insufficiently air-braked," and that it now seems practicable to increase the aforesaid minimum percentage without serious inconvenience to the carriers. After the required information has been received, a day for a hearing will be appointed. The roads are to report also the number of freight cars in use and the number equipped with air-brakes; and they must also send a statement of any instructions which have been issued respecting the use of air.

Standard Bridges on the Harriman Lines.*

The drawings herewith show the Harriman Lines' standard 125-ft. riveted through truss bridge. It differs in some essential details from the 100-ft. and 110-ft. spans previously shown, notably in the introduction of a fifth panel and in the design of the diagonals. In the intermediate panels of the 125-ft. span the diagonals are fabricated with an I-section from four 6-in. x 3½-in. x ½-in. angles and a 9½ x ½-in. web plate instead of two 12-in. channels with single lacing as in the shorter spans. Double diagonals are used in the middle panel, built up of four angles 4 in. x 3 in. x ¾ in. laced to approximate an I-section. The top and bottom chords are exactly the same as for the shorter spans, as is also the lateral bracing both top and bottom. The end bearings are correspondingly heavier and stronger, but in the details of the design no changes have been made. The estimated weight of one span complete is 220,000 lbs.

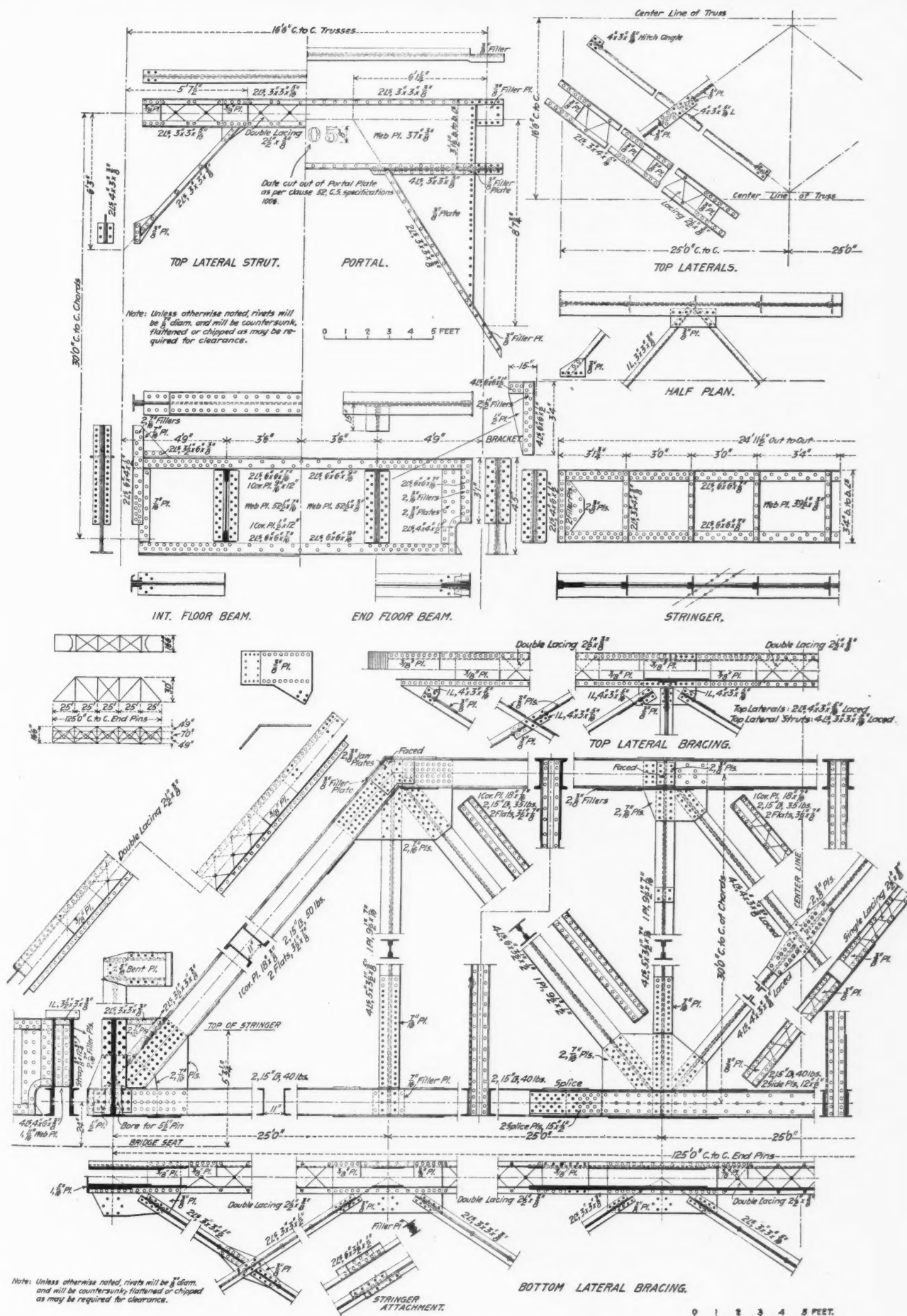
*Previous articles appeared in the Railroad Gazette March 17, 24, 31, April 7, 14, 21, 28, July 28, and Aug. 11.



EXPANSION END BEARINGS, 2 Sets Wanted.

FIXED END BEARINGS.

Details of End Bearings for 125-ft. Through Riveted Truss—Common Standard, Harriman Lines.



Details of Trusses and Floor System of 125-ft. Through Riveted Truss—Common Standard, Harriman Lines.

The New York, Westchester & Boston.

The New York, Westchester & Boston Railway Company, of which Mr. William L. Bull is the President, has let a contract for the construction of that portion of its line which lies within New York City, and the prospect that New York will have another railroad to the northeast, which has been in sight for many months but which has been subject to innumerable vicissitudes, appears now to be based on something more substantial than hopes and promises. In the several contests before city governments during the past year the Westchester company appears to have come out ahead of its competitor, the New York & Port Chester, in nearly, or quite, every case; and it has all along shown more evidence of adequate financial backing than has the Port Chester. The present contract, which is noted in our news columns, will amount to about \$3,000,000, and it is said that the contractor will begin operations within a week. About 300 men have been at work on the line for two or three months past under two temporary contracts, and these forces will probably be retained.

The New York & Port Chester was organized in 1901 to build a line from the Harlem river northeastward to the Connecticut state line, 21 miles, and a description of the project was published in the *Railroad Gazette* of May 2, 1902. Through the upper part of New York City the proposed line is parallel to the New York & Harlem (used by the main line trains of the New Haven), but sufficiently far away to secure, in that thickly settled district, a considerable passenger traffic. Through Mount Vernon the line still continues some distance away from the New Haven, but the rest of the way it was laid out very close to it. The Westchester company, though holding a charter over 30 years old, came into the field after the Port Chester company had tried for a year or two to get started and had made little or no progress. The Westchester line in a general way follows the same course as that of the other company; but beyond Mount Vernon the company proposes to run two lines; one to Port Chester and another northward to White Plains.

Of the contract now announced about \$1,200,000 is allowed for grading and masonry and the remainder apparently covers bridges and metal structures. This road, like the Port Chester, has promised the public a "four-track elevated electric road"; but, of course, will build its tracks on the surface or on earth embankments wherever right of way can be secured at reasonable cost. The line does not run longitudinally in the street at any point and the figures now given out indicate that practically the whole of the line is to be on embankments or on the surface, the term "elevated" meaning simply that grade crossings will be entirely avoided.

While the charter calls for a line beginning on the south at 129th street, the company proposes first to build a line from 177th street northward, as connection can be made with the lines of the Interborough Rapid Transit Company at 177th street.

The contests between the Westchester and the Port Chester companies before the city governments of New York, Mount Vernon, and other cities, have had to do wholly with the right to build bridges across streets. In New York the Westchester company has now secured this right. In Mount Vernon the Port Chester company secured it two or three years ago, but has made no use of the privilege. The petition of the Westchester company is still pending before the Council of that city.

A German Impression of British Railroads.

BY WILHELM CAUER,

Railroad Engineer and Professor at the University of Berlin.

In complying with your request to describe for your highly esteemed paper the impressions gathered on the English railroads, while traveling there for my instruction, I am given a chance to extend my thanks to the railroad companies of the United Kingdom for their hospitality. Yet, I give this description with some hesitation, because I feel the truth of the objection that even an extended journey is not sufficient to enable a correct judgment to be made of foreign organizations. I am perfectly willing, therefore, to take good advice wherever I may make a mistake.

English railroads are in nearly everything quite different, not only from German railroads but also from other Continental railroads, so far as I know them, and in my opinion this is chiefly due to the insular location of the United Kingdom and to the different national characteristics of the personnel. Compared with Germany, the difference results mostly from the fact that German railroads are under the control of the government while English railroads are operated by private companies. I myself am a thorough partisan of governmental ownership, at least so far as German conditions are concerned, but in England this system would not have many friends and I doubt whether it would be appropriate for the English state of affairs. I have to confess that English railroads give an excellent service, which is in many instances superior to the German. A considerable part of the benefit derived from German railroads lies in other spheres; in equalizing commercial fluctuations, promotion of industrial and agricultural activity, and, last

but not least, in their production of a surplus for the national treasury. From this it will be easy to perceive that the effectiveness of the two railroad systems cannot be compared off-hand, and English railroad men agree with me in this.

The German traveler will note in the first place that the passenger traffic in England is much larger and that it is handled with great attention. London and other large cities have a dense network of railroads for suburban traffic, which had reached large dimensions there before other countries thought of establishing special services for this kind of business. I have found it especially remarkable that convenient communications exist as well between the various railroad stations in London as between these stations and those of the underground lines, which shows that the competition between the different companies has not prevented them from realizing that it is not only to the interest of the traveling public but also to their own interest, to facilitate the communication between stations in order to promote traffic and to guide travelers from one line to the other. Besides the urban and suburban traffic, numerous express trains are provided for greater distances and comfortable cars are used in most cases. The geographical situation greatly facilitates railroad traffic in general, as the bulk of it can be carried on a certain number of chief lines of limited extent, mostly not longer than a few hundred miles; for example, London-Plymouth; London-Cardiff; London-Manchester; London-Edinburgh; Hull-Manchester-Liverpool, etc. Those who wish to go to less important places or to towns out of the way of the main lines do not object to changing trains several times. We on the continent are in the midst of the network of all the European railroads. Lines of great importance cross each other in all directions, most of them coming from foreign countries and going to other foreign countries, and travelers prefer to be carried without being obliged to change cars, even when they change the railroad line, cross the frontier of a state, or go from a main to a side line. It is possible to go from Berlin to Vienna, from Vienna to Ostende, or from Budapest to Paris, without changing cars, and even when going from a main line to a side line as for instance from Berlin to Kissingen, Wernigerode or Meran, no change of cars is necessary. For this reason many of our express trains are composed of through cars, which originate from or are given later to other trains, going in other directions. This, of course, necessitates another kind of train service.

It is sufficient, then, to say that excellent care can be taken of the passenger traffic in England, owing to her geographical situation and other favorable circumstances. However, it is not always easy for the traveler to select from the many trains at his disposal those which will be the most suitable for his purposes. This may be less true for an Englishman than for a foreigner. At all events the new arrangement by which the Bradshaw time-table compiles in a special edition the express trains running between the chief cities is a great convenience. As a whole I must avow that English time-tables did not seem to me easy to use. We are accustomed to see the figures indicating the minutes during the night time, i.e., between 6 p.m. and 6 a.m., underlined, in order to distinguish them from those of the day time. If one is accustomed to this system, one can see at a glance at what time a given train is running, but errors will easily occur if one has to look for the items a.m. and p.m. at the head of a column, especially with trains which start before noon and continue their run after noon, and *vice versa*. In several Continental countries, railroad hours are counted from 1 to 24,* and as soon as one has become familiar with this method, no error is possible.

Although the great advantages of terminal stations for the handling of passenger traffic are recognized on the Continent, these stations are only used in special cases. If terminal stations are used more frequently in England, I do not agree with my colleagues on the Continent that this is due to the predilection which English railroad engineers have for these stations, but I think that there are other reasons. Competition has induced many railroad companies to advance their stations as far as possible into the center of the cities, even at great cost for building tunnels, bridges and viaducts, and terminal stations have been the result of this desire. On the other hand, it is the insular situation of the country and the direction of the traffic, which causes railroad lines to terminate in large cities more often than is the case on the Continent, where there is more through traffic; consequently, the disagreeable features of terminal stations; the change of the direction of trains, change of engines, etc., are less important. It is only natural that practical Englishmen appreciate the advantages of through stations. This is shown by the great number of very well built through stations, as for instance Victoria station in Nottingham and Waverley station in Edinburgh, and especially by the construction of a new high level bridge over the Tyne at Newcastle in order to avoid turning the train between London and Edinburgh.

In England they like very much to have the cabs directly aside the arrival platform which, by the way, is never the case on the Continent, and considering the peculiar way of handling luggage in England, and the absence of package receipts, this enables travel-

*This is also done in Canada, India, etc.—[EDITOR.]

lers to leave the station in a cab with their luggage within a few minutes after their arrival. The introduction of cab roads into stations is easier at terminal stations than it is at through stations. It is especially noteworthy, therefore, that cab roads have been provided for with much ingenuity at Waverley, which is a through station.

But there are many other points of difference between English and Continental stations, especially as regards the loading and unloading of horses, carriages, automobiles, milk, etc., within the station trainshed. This is always done on separate tracks, outside the trainshed in Germany, which simplifies the movements within the station. Contrary to this tendency, we are now building at large stations on the Continent—wherever we can—separate platforms for the handling of luggage, even using special elevators for this purpose, in order to avoid interfering with passengers. Considering the way in which luggage is handled in England, and that the traveler himself has to look after his belongings, it would be useless to have special luggage platforms there.

At small stations in Germany the second track is commonly reached by crossing the first track; in England, however, both tracks are accessible from the outside only. An arrangement quite similar is found in France, but there it is customary to place a station building only on one side, and on the other side a shed. In England, however, I have usually seen station buildings of about the same size on both sides. This is more comfortable for the travelers, but more costly for the railroad companies. As a whole, waiting rooms in England are not as spacious as they are in Germany.

I have gathered the impression that England endeavors to use more and more island platforms in connection with the two platforms at the outer side of the tracks. At junctions, and where there are four-track lines, it is necessary to have island platforms. It is more advantageous, as I have noticed at various places, to have in these cases no outside platforms. This not only reduces the cost of buildings, but simplifies greatly the service of the station employees. On account of the great traffic in England there are more four-track lines than in Germany, and an island platform between fast and slow tracks has the advantage that travelers going in one direction will always leave from the same platform.

Continental travelers are often alarmed at the English way of handling luggage without receipts. I soon became acquainted with the English custom, however, and always found my luggage immediately upon arrival. But this is inconvenient in case one has to change trains several times and even English railroad employees advised me that it would be good policy to look after my belongings myself. This is never necessary on the Continent. When traveling between large cities it is not necessary, as a rule, to change trains, and even if the train is divided, one need not care for one's luggage, as each division of the train has its own luggage compartment and unloading and reloading is consequently avoided. Although the English method seems to be appropriate for the United Kingdom, it would never do to introduce it on the Continent, not only because nobody would like to miss the guarantee for safe delivery of luggage afforded by a receipt, but, considering the long distances, the complicated routes and the fact that many journeys extend over day and night, it would be a great inconvenience for passengers to watch their luggage constantly.

One thing which especially strikes the railroad engineer coming from the Continent is the great care taken in England to avoid grade crossings of any description, by either building bridges over the tracks or tunnels underneath. Another remarkable feature in England is that fences are erected often along the entire length of a line. Grade crossings over side tracks or shunting tracks are common, however. I was told that grade crossings between tracks of different companies are not allowed. Furthermore, I have found that junctions occur much oftener outside of stations in England than they do in Germany, as we always endeavor to keep the tracks of parallel running lines separate up to a short distance from the platform, thus bringing the junction under the protection of the home signal of a station. A difference in the working of trains seems to be responsible for this difference of practice. In England it is the signalman who is responsible for the movement of trains, while in Germany a dispatcher gives his orders by way of an electrical or mechanical block apparatus to the signalmen in the stations, and the signalmen outside the stations have no influence upon the succession of trains. The latter regulate only the direction of trains, and rear-end collisions are avoided by lock and block signals or other means of the absolute block system. The English method has the advantage that those men who really give the signals are near to them have all the responsibility. Recognizing this need of nearness, the German management places the dispatcher who directs the working of the trains in the most important signal tower of the station. On the other hand it might be an advantage, especially for large stations, to place the command in one hand in order to avoid errors and misunderstandings. Great responsibility is entrusted to English railroad signalmen; but the English railroads have an excellent staff of employees trained from boyhood,

and they generally stay at the same place for many years. In Germany we have to reckon with the necessity of employing a large force of men who have served for 12 years in the army. Their railroad training must necessarily be shorter, and, moreover, they change their place of employment rather often.

All our devices relating to signaling, interlocking and the block system have been adopted from England, where much earlier than in Germany the density of traffic required that signals be made mechanically dependent on the right position of switches and that a certain distance be maintained between the trains. It is noticeable, however, that German signaling devices differ widely from those of English railroads. Safety appliances in the United Kingdom are much more simple than in Germany, both in operation and in the design of individual devices. As far as construction is concerned, Germans endeavor to obtain the highest efficiency by constant improvements. The Board of Trade allows a larger freedom than the respective German legislative bodies. For instance, the lock-and-block system is used to a greater extent in Germany than in England. The Prussian and Hessian railroads under governmental control consist of over 8,000 miles of two track main lines, and more than half is equipped with lock and block devices which also control the interlocking at stations and junctions without impeding the free movement of trains. Furthermore, it is required that in Germany all interlocking shall have preliminary or latch locking. Although this construction is well known in England and was formerly much used, interlocking directly by the levers is now preferred, because simpler in construction. In England single wires are used for moving the signals and the Board of Trade evidently allows dependence on a counterweight to return the arm to danger. In Germany this is held to be dangerous, because the wire might be caught and the signal might thus remain in its clear position; or its movements might be prevented by snow or wind; or the position of the arm might be varied by temperature, which is liable to change the length of the wire. For these reasons double wires are used without exception in Germany. A tension weight equalizes the effect of changes in temperature and in case a wire breaks this weight forces the signal arm to "stop." In England locks are only prescribed for facing points, while in Germany all switches have to be provided with them; they are actuated by the same mechanism which moves the switch, an arrangement which I have found in England only in the Crewe all-electric interlocking. While in England rods are prescribed for switch connections double wires are often used in Germany and nearly always in Prussia. In case of breakdown, such as a stone catching in the switch, all conflicting switches are protected by stop signals. For this purpose, of course, complicated arrangements are necessary.

Whether it is better to avoid accidents by improving the mechanism and making it more complete, or whether it is better to make it as simple as possible and rely more upon the efficiency of the employees will always largely depend upon the quality of the latter and, as I have remarked, English railroad employees are of a higher standard than those in Germany.

There is another striking difference; the signal system as a whole is much simpler in Germany than it is in England. A German railroad man is astonished to see the large number and great variety of signals; home, distant, starting, advanced starting, shunting, backing, siding, calling-on, dwarf and disk signals, some of which, however, are practically the same. This is the more noticeable to one who is not accustomed to it. After dark, when danger is increased, one has to be content with two colors, red and green. We have in Germany only two kinds of signals, the distant signal in the form of a round disk and the semaphore, which, in the same form (with one to three arms) is used as home and starting signal. These signals can be distinguished during darkness as well as during daylight. The home signal is called, according to its position, entrance signal, block signal, or protection signal.

The position of single isolated switches is distinguished by switch signals which are distant signals and which show at night as well as at daytime the same color, namely, white. They resemble the English disks and they are low, in order to avoid confusion with the chief signals. There is no doubt that a system having shunting, backing and other signals of this kind is more complete than one which merely indicates the position of a switch, and that it will better protect against accidents, especially during the daytime; but on the other hand, even in Great Britain, they seem to object to having too many kinds of signals. Major J. W. Pringle says, for instance, in his report on the accident of Sept. 17, 1904, at St. Enoch station, Glasgow:

It is highly desirable, both from the point of view of safety and for traffic purposes, that signalling in a large terminus should be as complete as possible. At the same time there is a danger to be guarded against, namely, confusion owing to a multiplicity of signals.

It seems to be difficult to find out whether accidents occur oftener because there are no special shunting signals, or on account of mistakes caused by too many signals near together.

Not only in regard to the number of signals but also in regard to interlocking, English rules are more stringent. We interlock

switches with signals, but in England they also interlock switches with switches. I was told that this is done to avoid collision between two conflicting shunting operations. The Board of Trade prescribes locking bars and detectors for each facing point; we have a point lock for all switches working with the switch movement itself; and at facing points we have detectors. In complicated cases we avoid changing a switch under a moving train by route levers (this by the way has also been done in England occasionally) which lock all switches and which at the same time leave the signal free though it cannot be restored to its first position before the train has either gone over a treadle or an authorized employee has removed the lock by electrical transmission. Although it is difficult to determine the advantages of one system as compared with another, it must be conceded that, as far as accidents are concerned, British railroads have a very satisfactory record.

England is far advanced in the introduction of electric railroads. I have had occasion at various places to become acquainted with these practical and comfortable means of transportation.

As far as freight traffic is concerned, English railroads are more efficient than Continental railroads, especially in regard to the quickness of forwarding parcel goods; this is due to various favorable circumstances, viz., the geographical simplicity and the very complete railroad network of lines, as well as the classification of goods, which makes it possible to send more through cars from one place to another, thus avoiding transferring goods to a greater extent than is possible on the Continent. Very good arrangements are made for quick forwarding. The railroad companies themselves do the trucking of goods to and from the stations and the division of traffic into various classifications is thorough. This makes it easier to carry each class of goods in those vehicles which are the most suitable. Hoisting appliances of many kinds are more frequently used in England than on the Continent. This is apparently due to the fact that open cars are used very extensively in England. I was told, however, that the use of box cars is becoming more frequent, and the application of mechanical lifting is consequently decreasing. Hoists, however, will never lose their importance at stations with several stories. They must be used for hoisting cars from one track level to the other and for moving goods between the different stories. Stations with several stories are not so prevalent in Germany. In England I have been astonished to see how quickly and cleverly plants have been erected on a very limited space and how fast and safely under these difficult circumstances trains are made up by the aid of turn-tables and hoists. Elevators for moving goods from one story to the other of the big warehouses also play a more important part in England than on the Continent, because English railroads not only attend to the freight but also to much of the storage business. German railroads, as a rule, do not concern themselves with this. A feature of English railroading is the great establishments with their perfect arrangements for receiving and despatching coal cars, and to unload coal from railroad cars into steam ships.

Transfer stations and shunting yards are less important in England than they are on the Continent, because it is necessary on the Continent to have extensive accommodations for receiving, making up and despatching trains coming from very far and going in many cases to distant places. In Great Britain freight trains go very often from one freight yard to another without any considerable change in make-up. Goods which are shipped in bulk seek naturally the shortest route to tidewater. Thus in spite of the immense freight traffic the establishment of new switching yards is now rare in England. It is remarkable to find a considerable number of old switching yards which, taking advantage of grades, are so well made that they still serve as models. The use of these yards is convenient for the English roads because all freight cars are fitted with lever-brakes, which, as I have observed at Edge Hill, Amtree and Shildon, provide a splendid method for regulating the speed of cars going down grades with a limited crew, whereas we on the Continent have the screw brake system which requires one man for each car. Moreover, not all of our Continental cars are equipped with these screw brakes, so that we have to resort to other braking devices in our switching yards. While our brakes are developed to a remarkable degree, the English lever brakes are superior in flexibility of operation.

I must omit one of the most important subjects in connecting with railroading, that of rates, as I have not had sufficient opportunity to gather the necessary information. I wish to add, however, some remarks about the agreements between the different English railroads and also those institutions and regulations provided by the supervision of the governments. Likewise standards of gage, technical conditions of railroads and rolling stock, through cars, through tickets, bills of lading, etc., have for a long time on the Continent depended upon private agreements of the railroads. It is not until the last third of the last century that the government took an active interest, but now, with us, many and especially the most important standards are regulated by state legislation or by treaty, in the case of shore roads which cross the boundary. In England there has been a similar outgrowth, except that now,

as formerly, because of the private ownership's system, private agreements between the railroad companies are more frequent than with us. However, the fact that Great Britain is an island largely eliminates the necessity for shore international treaties which have rendered the task of systematizing exceptionally difficult on the Continent. With us, the ever growing extension of large government railroad systems has limited more and more shore cases in which railroad tracks and terminals have had to be used jointly. In English railroad administrations, agreements to this purpose occupy naturally an important place, and it appears to me, from somewhat hasty observation, that in Great Britain original and complete judicial forms have been developed for such agreements which solve in a comparatively simple and frictionless manner the difficult problem of the exchange of traffic between independent systems. Likewise, England has attained a far reaching uniformity in the matter of rules, regulations, and signaling, through the joint endeavors of the railroad companies and the influence of the Board of Trade. It is now only desirable for this uniformity to be extended in details, as for instance in the form and meaning of certain signals. On the other hand, it strikes the Continental railroad man that very little has been done with those rules and regulations which, according to our ideas, ought to be most uniform. I refer to a uniform loading gage and capacity and a uniform standard in building cars. As to the first point, we have a uniform loading gage, and only two capacities throughout the united German railroad system, i.e., in Germany, Austria-Hungary, Roumania, Netherlands, and Luxemburg. On the other hand, each of the English railroads has its own loading gage. Moreover, on the Continent we have for all countries with a standard track gage (4 ft. 8½ in.) as established by the treaty of Berlin, 1886, on technical uniformity, uniform technical specifications for building those cars and coaches which cannot be rejected on crossing the boundary. In more local associations, as in the United German Railroad Administration and in the German empire, they have made even further progress in systemizing the details of uniform organizations. In the near future, Germany will adopt a joint rolling stock (locomotives, cars and coaches) for all state railroads; that is, for practically the whole German empire. On the other hand, the English railroads have only for private cars the standard specification issued in 1903 which serves, however, as a sort of guide to the railroad companies in building their own rolling stock, without being obligatory. Thus, for example, the through operation of passenger trains over the tracks of several different companies is rendered difficult by the existence of two different brake systems. However, this difficulty is largely overcome in the case of certain trunk lines by the adoption of joint rolling stock.

By far the greatest uniform organization which the English railroads have developed is undoubtedly the railroad clearing house, whose principal object is the apportionment of mileage and traffic receipts. This, however, serves at the same time as the center of English railroad companies for creating uniform organization and rules and regulations on all lines. I was afforded a chance to become acquainted with the working of this institution, and had occasion to wonder at the simple manner in which it handled the intricate joint traffic problems of the railroad companies. On the Continent, in spite of far more complex situations, we have no similar organization; on the contrary, separate offices have to be maintained to apportion mileage and traffic receipts.

If, in closing, I should attempt to describe the general impression which I had obtained of the English railroading, I would say its most striking characteristic was the excellent handling of the traffic, and earnest successful progress in every direction.

Opening of the Uintah Reservation.

On July 15 President Roosevelt signed the proclamation which in effect throws open to settlement the lands of the Uintah Indian Reservation in Utah on August 28. The total area of this reservation is 2,444,000 acres, of which 1,069,160 acres are available for entry. The mode of procedure for the allotment of these lands will be similar to that in effect at the opening of the Rosebud Reservation in 1904 (*Railroad Gazette*, June 3, 1904). All applicants should register in person at the United States land office at either Grand Junction, Colo., or Vernal, Price, or Provo, Utah. The registry books will remain open August 1 to 12. The drawing to determine the order in which the applicants may choose their quarter section of land and make entry thereon, will be held at Provo, Utah, at the rate of 50 names per day, commencing Thursday, August 17.

A circular issued by the Chicago & North-Western Ry. concerning the opening of this reservation describes it as lying in the north-central part of Utah, in Uintah and Wasatch counties. It extends from the Green river on the east to Heber, county seat of Wasatch county, on the west, and to the crest of the great Uintah mountain range on the north, comprising land rich in agricultural and mineral possibilities. A large portion of this tract of land is remarkably fertile. The climate is temperate, with almost perpetual sunshine. The altitude is from 4,000 to 6,000 ft. above the sea. In addition to

the agricultural lands, there are also large tracts of grazing land on which cattle, sheep and horses may be raised with great success. The lands are watered by the Duchesne and Uintah rivers.

The reservation is reached by the Uintah Railway from Mack, Colo., on the Denver & Rio Grande to Dragon, Utah, and thence by stage across the White river to Vernal. There is daily service from Mack to Dragon.

Railroad Shop Tools.

(Continued.)

PLANERS.

The accompanying illustration, Fig. 1, shows a 48-in. planer recently made by the Betts Machine Company, Wilmington, Del., for the Reno, Nevada, shops of the Southern Pacific. This machine planes 49 in. wide by 49 in. high. The bed is long and is well braced with cross girts of box form. The table is 38 in. wide and is driven by cut steel gearing and rack. Its motion can be controlled from either side of the machine. An automatic oiling device is provided for lubricating the table Vs. The machine can be arranged for either parallel or right-angle drive, as desired. All feeds are positive and can be operated at any angle. The cross-rail is of the box girder type, with deep arched back, and is elevated by power. It is of sufficient length, when using two saddles, to permit of one head planing the entire width between the housings. The housings are of double plate construction. This insures ample rigidity for side cutting. The side-heads have independent power feeds in either direction and are counter balanced. This machine can be furnished with from one to four heads, as desired. The weight of a machine of this type having a capacity for planing a piece 14 ft. long is about 36,000 lbs.

Fig. 2 shows a 42-in. forge planer made by the Niles-Bement-Pond Company, New York. This machine can be furnished with either parallel or right-angle drive. It will plane a piece of work 43 in. high by 43 in. wide and any required length. The movement of the table in the machine shown is at right angles to the line shaft, and it is driven by a train of cut gearing and a rack from

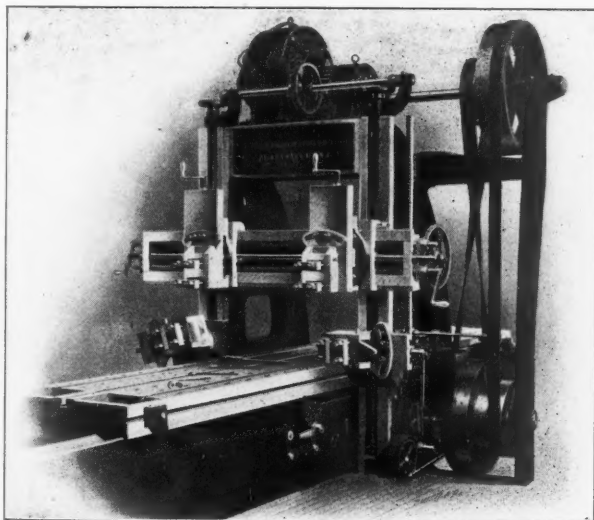


Fig. 2—Niles-Bement-Pond 42-in. Forge-Planer.

a cross belt for the cutting and an open belt for the return motion. The pulleys are of large diameter and are proportioned to return the table at a speed of 54 ft. or more per minute. The belt shifter is designed so that it guides one belt entirely off the pulley before starting the other one. This arrangement permits the stopping of the table instantly from either side without stopping the belts. It is independent of the feed and is arranged to clear the reversing-dog, thus allowing the work to be run from under the tools for inspection. The bed is strongly reinforced where the gearing and

uprights are mounted and is nearly twice the length of the table. It has two V tracks with large wearing surfaces and oil pockets and rollers are provided for lubricating the table. The uprights are of box form and have a bearing the entire depth of the bed and are tied at the top by a deep and wide arch. The cross-rail is also of box form. It is raised by power and has a deep arched double-walled back, large wearing surfaces, taper packings for the adjustment of the saddles, and sufficient length when fitted with two saddles so that one can plane the entire width between the uprights without interfering with the other. Variable feeds are provided for all directions. These are driven directly by the driving-gears instead of by friction and can be operated by hand from either end of the cross rail.

The 36-in. x 36-in. extra heavy pattern spur-gear planer shown in Fig. 3 is made by the G. A. Gray Company, Cincinnati, Ohio. This is a powerful machine and is designed to do heavy work. It is

made in lengths suitable for planing from 8 ft. to 30 ft. inside of pockets. The table is 32 in. wide and is fitted with two independent pairs of dogs; the extra pair on the rear side of the table operate in connection with an extra shifter lever. This duplex shifter lever is connected by a shaft which runs directly through the bull-wheel shaft. To each lever there is hinged a patent "trip" which is lifted when it is desired to let the table run forward without disturbing the rear dog. Thus the operator can fix the work, set the dogs and start the cut entirely independent of the front side of the machine and without leaning over the table or walking around the planer. Attached to the shifter lever is an automatic locking device by which the belts are prevented from accidentally starting the table. The cross rail is long enough to allow one head to be run entirely

out of the way so that the other head can be used to plane the full width of the machine. The cross rail is fitted with a power elevating device and the saddles are made right and left-hand, so that they may be run close together. All feeds are designed to be operated at either end of stroke and the feed screws run in ball bearings. The length of the automatic down-feed is 15 in. and the down-feed screws are provided with micrometers graduated to thousandths of an inch. The uprights are of box form; they are tongued and grooved and are bolted firmly against the sides of the bed.

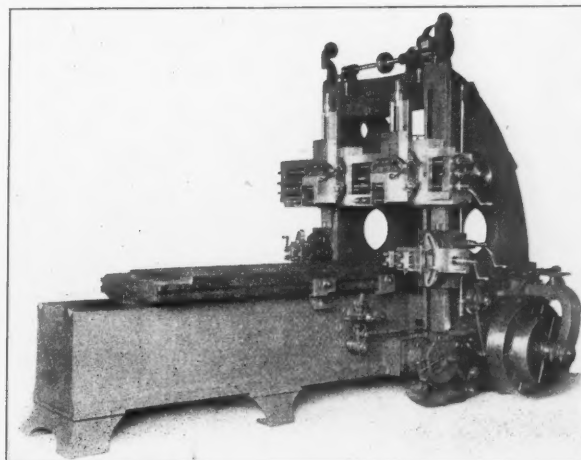


Fig. 3—The G. A. Gray Co.'s 36-in. x 36-in. Spur-Gear Planer.

Side heads can be fitted to either one or both housings, as shown. They are counterbalanced and are provided with automatic independent vertical feeds and swivels so that they can be used to plane at any angle. The belt shifter is designed so that one belt is moved entirely clear of the driving pulley before the other belt comes on. The pulleys are wide, thus assuring great power and less slipping of belts. The bearings for the driving shafts are not bolted on, but are of large solid bushings, which fit into holes in the planer bed. The Vs of the bed and table are oiled automatically

by conical rollers which are supported in pockets in the Vs of the bed. These machines range in weight from 16,000 lbs. to 36,350 lbs., according to the length of the bed.

(To be continued.)

Census Valuation of Railroad Property.

The Census Bureau has issued Bulletin No. 21 containing an elaborate estimate of the commercial value of the railroad property of the country, prepared under the supervision of Professor Henry C. Adams, Statistician of the Interstate Commerce Commission. The term "commercial value" is used to denote the value of a railroad as looked at by an investor; that is to say, its market value. The main factors used in arriving at this value have been the capital and net earnings. In calculating capital, obligations not having to do with the direct operation (as, for example, those based on ownership of another railroad) have been excluded; and in calculating net earnings, the taxes and operating expenses have been deducted from gross receipts, but expenditures for improvements have not been deducted. Income from investments of other railroads and outside property is, of course, excluded. The Bureau disavows any purpose to fix a valuation for taxation or as a selling price.

The commercial value of railroad operating property in the United States, computed for the year 1904, was \$11,244,852,000. The apportionment among the states is shown in the following table:

Rank of state.	State or territory.	Commercial value of railway operating property, June 30, 1904.	Latest reported value as assessed for taxation.	Ratio of assessed to commercial value, per cent.
24	Alabama	\$150,211,000	\$53,926,026	35.9
51	Alaska	100,000	...	...
44	Arizona	68,356,000	6,667,349	9.7
27	Arkansas	124,626,000	34,709,623	27.8
8	California	359,694,000	92,378,550	26.3
19	Colorado	198,261,000	49,492,135	25.0
32	Connecticut	105,369,000	120,493,648	114.4
49	Delaware	17,285,000	...	...
50	District of Columbia	5,578,000	2,486,024	44.6
37	Florida	80,467,000	21,817,478	27.1
22	Georgia	156,065,000	63,105,810	40.3
34	Idaho	91,877,000	19,115,378	20.8
3	Illinois	805,657,000	425,700,655	63.8
40	Indian Territory	79,405,000	...	...
6	Indiana	375,541,000	165,863,367	44.2
9	Iowa	344,847,000	57,535,160	16.7
7	Kansas	356,356,000	60,003,534	16.9
23	Kentucky	155,772,000	77,658,040	49.9
28	Louisiana	123,401,000	29,044,195	28.9
38	Maine	80,146,000	...	...
25	Maryland	132,342,000	...	...
15	Massachusetts	250,053,000	...	...
13	Michigan	277,597,000	196,795,000	70.9
5	Minnesota	466,734,000	...	...
31	Mississippi	107,884,000	29,847,640	27.7
11	Missouri	309,768,000	97,916,869	31.6
20	Montana	196,209,000	36,759,827	18.7
14	Nebraska	263,170,000	46,082,853	18.5
46	Nevada	43,745,000	13,778,049	31.5
39	New Hampshire	79,786,000	22,425,000	28.3
10	New Jersey	333,568,000*	231,655,525	69.5
36	New Mexico	86,400,000	8,511,538	9.9
2	New York	898,222,000*	229,582,064	25.6
30	North Carolina	113,146,000	69,480,974	61.4
29	North Dakota	123,390,000	22,160,304	18.0
4	Ohio	689,797,000	133,858,945	19.4
41	Oklahoma	78,668,000	11,936,317	15.2
42	Oregon	75,061,000	...	...
1	Pennsylvania	1,420,608,000	15,832,003	61.6
48	Rhode Island	25,719,000	...	...
43	South Carolina	75,500,000	29,467,716	39.0
45	South Dakota	49,646,000	14,354,030	28.9
26	Tennessee	131,166,000	58,536,566	46.6
16	Texas	237,718,000	95,209,785	40.0
35	Utah	90,325,000	20,682,461	22.9
47	Vermont	37,311,000	27,344,020	73.3
21	Virginia	211,315,000	63,269,623	30.7
17	Washington	182,837,000	26,065,940	14.2
18	West Virginia	201,799,000	28,771,358	14.3
12	Wisconsin	284,510,000	218,024,908	76.6
33	Wyoming	100,307,000	7,498,232	7.5
..	United States	\$11,244,852,000*	...	...

*Exclusive of Jersey City ferries of the Pennsylvania Railroad system. The value of this ferry property is \$5,698,000.

The above valuation does not include the value of Pullman cars or private cars. The physical value of this equipment, that is to say, its value independent of the commercial use to which it is put, is estimated as follows:

Pullman cars	\$51,000,000
Private cars	72,000,000

The total number of Pullman cars "available for the business of the company" on July 31, 1904, was as follows:

Standard cars with sleeping accommodations	2,903
Ordinary, or tourist, cars, with sleeping accommodations	547
Parlor cars	464
Composite, dining and other cars	85
Total	3,999

Foreign Railroad Notes.

The state management which succeeded the three operating companies in Italy July 1, works about 6,500 miles of railroad, there being one long line (Bologna to Brindisi with branches) and many short ones worked by the companies owning them. So far many of the arrangements for operation are provisional, continuing the

methods which the operating companies followed. The rolling stock was their property, which the government must pay for, and some months ago authority was sought to borrow \$200,000,000 for this purpose at 3.75 per cent. Meanwhile, the companies agreed to take bonds for about half of the sums due them; and the Ministry comes on the money market for only \$100,000,000 at 3.65 per cent.

The Shanghai correspondent of the London *Express* says that the concession for the Hankow-Canton Railroad has been given up by the American-China Development Company, and that the road is now being built by Japanese engineers. The Japanese engineers are engaged ostensibly by the Chinese Government, but the correspondent says that the capital as well as the brains will come from Japan.

Those who have to plan and execute city underground railroads, which, though very few in number, are of very great importance, and seem likely to be a necessity of existence of all cities of the first class, need all the help they can get, and will doubtless welcome the publication of what is said to be a very elaborate account of the new Paris City Railroad by Prof. Ludwig Troske, of Hanover, who studied it on the spot during its construction, and with the help of 456 engravings has endeavored to make it plain to his professional brethren. In reviewing this work the *Journal* of the German Railroad Union says: "It has an educational importance inasmuch as it doubtless will awaken the mind for the comprehension of great problems in a great way; and such an education is needful where, in consequence of the increasing municipalization and nationalization, the engineer is limited in his development and freedom of action, and therewith insensibly in his habits of thought, and especially in his capacity for making decisions—a danger which comes to notice especially in foreign enterprises." Just so.

New German Passenger and Baggage Rates.

For several years the subject of the revision of the passenger and baggage rates on the German railroads has been under discussion. Endless complications have continually arisen because each state of the empire has reserved the right to regulate the rates on the railroads within its own boundaries. For example, 55 lbs. of baggage was transported free of charge on the Prussian lines, a regulation that was not recognized in the south.

At a meeting of the representatives of all the German railroads held in Berlin on January 16, 1905, the matter was thoroughly discussed and referred to the administrations who called a second conference for March 29. This was again assembled in May. There was a good deal of opposition to the suggestions of Prussia who wished to enforce her own regulations upon all of the other states, although such a course was hardly justified by the declaration of the Prussian minister of finance to the effect that no tariff could be adopted that entailed a loss on the railroads. The reform was therefore based upon a simplification and unification of the tariffs and not necessarily upon a reduction. The difficulty of such a unification was very great, owing to the multiplicity and variations of the German tariffs; the railroads of each state having their own, either with or without free baggage allowances, and with or without taxes on special and express train tickets.

The original Prussian rates took the 4th class at 2 pfennigs per kilometer as a base and added 50 per cent. to this for each higher class, making the rate 3 pf. for third class, 4.5 pf. for second class and 6.75 pf. for first class. The new joint rates are the same, with the exception of the first class, which is 7 pf. In the matter of return tickets that are good on express trains there is still some variation on the several states. It may be added here that in the case of the fourth class, which was one of the greatest obstacles to the unification of the rates, Bavaria flatly refused to introduce it, and the other southern states that consented to do so did it reluctantly, considering it an anti-democratic move. There is also a variation in the Bavarian tariffs in that while the rate is 3 pf. per kilometer on express it is but 2 pf. on accommodation trains.

In the transportation of baggage the passengers have not been favored, and the new ruling will hardly be popular with the German public. All free transportation of baggage has been done away with, and instead a zone system of tariffs has been introduced. The rate is based upon 25 pf. for 25 kilos. (55 lbs.) of baggage for each run, 25 kilometers with a special rate of 20 pf. for short zone distances. The first zone extends from 26 to 50 kilometers; the second from 51 to 100, and so on by increments of 50 kilometers up to 500. Thence the progression increases by 100 kilometers up to the fourteenth zone, which is 800 and above.

In the matter of special tickets, such as workmen's cards, Sunday excursions and the like, they remain for the most part unchanged. As to the passengers, especially those of Prussia, while they certainly appreciate the proposed reductions in fares there is a demand for still further lowering of the rates and an extension throughout all Germany of the free transportation of baggage up to 25 kilos.—*Le Journal des Transports*.



GENERAL NEWS SECTION

NOTES.

According to a press despatch from Reno, Nev., the Southern Pacific is to erect, at Sparks, in that state, a building to be used as a school for instructing apprentices for the company's shops, the school to be conducted by the Nevada State University.

The gradual evolution by which the electric railroad and the steam railroad may some time become assimilated and indistinguishable has lately progressed one degree; the motormen of the San Bernardino Valley Traction Company, in Southern California, have been ordered to wear overalls and jumpers instead of blue uniforms.

The new Canadian Railway Commission has begun to perform its rate-making function with a vigorous hand, the Grand Trunk and the Canadian Pacific having been ordered last week to reduce the rates on export grain from points in Ontario, to Montreal, to a level with those charged from points in the United States to the seaboard under similar circumstances.

At Truckee, Cal., recently a car loaded full with dynamite escaped control while being switched, and, while running about 10 miles an hour, collided with an oil tank car, breaking in the end of the box car and allowing the dynamite to be scattered around on the ground, some of it as far as 40 ft. away from the track; and yet there was no explosion.

The Michigan Central, the Pere Marquette and the Union Pacific have notified the Interstate Commerce Commission that their contracts with the Swift and Armour companies for the use of refrigerator cars will not be renewed; and that it is the intention of the roads to furnish their own refrigerator cars and reduce the charges for icing. This action follows the investigation into the Michigan refrigerator traffic which was made by the Interstate Commerce Commission last year. (*Railroad Gazette*, Aug. 19, 1904, and July 7, 1905.)

A press despatch from Chicago says that the east and west trunk lines and those from New Orleans to the Missouri river have settled their fight concerning rates on sugar to Kansas City and St. Paul. The all-rail rate from New York to Kansas City, etc., will be 44 cents, and from New Orleans 34 cents; to St. Paul, from New York 33 cents; from New Orleans 30 cents. During the rate war, which has been going on for the past few months, the rate has been 10 cents from New Orleans to Kansas City, etc., and 15 cents from New York.

The complaint of the Gulf Refining Company, of Texas, that the railroads charge much higher rates on Texas oil carried northward than on similar oils carried southward from Chicago, Louisville, and other places, appears to have had satisfactory effect without being brought to a hearing, for the Illinois Central and the Louisville & Nashville have now announced that their freight tariffs have been revised and the rates on crude and refined petroleum made as low from New Orleans to northern points as those enjoyed by shippers of petroleum from northern points to New Orleans. It will be remembered that in the complaint, filed about a month since, it appeared that the rate per 100 lbs. from Louisville to New Orleans was 18 cents, while the rate in the opposite direction was 35 cents.

Enola.

To accommodate its employees who are compelled to move from Harrisburg across the Susquehanna river to the big new freight yards and shops, the Pennsylvania Railroad has literally built the town of Enola. Forty families are already moving into handsome cottages built for them by the railroad company. These cottages are built in pairs, with fine lawns in front and side yards, and with 30-ft. drives in the rear. The houses are well finished in the latest style, with bathrooms, hot and cold water and front and side porches. All the streets are macadamized, and a fine water supply is provided from three artesian wells, the water plant including pumping engines and a big stand pipe for pressure. The Enola Inn also has been put up and a handsome public school building will be ready for occupancy in the fall.—*Philadelphia Inquirer*.

Railroad Taxes in the State of Washington.

Washington has no uniform method for the assessment of railroad property. The matter is entirely in the hands of county assessors and county boards of equalization to fix the values within their respective jurisdictions. There is a state board of equalization, but it was shorn of its powers to a large degree by the legislature several years ago. It can equalize only taxes which the counties have to pay to the state. For example, if the county taxing authorities should assess a railroad at \$5,000 a mile, and the state board should raise the assessment to \$7,500 a mile, that in-

crease would apply only upon the taxes the county paid to the state. The railroad would pay its taxes to the county treasurer on the basis of \$5,000 a mile, and the county must remit to the state on the basis of \$7,500 a mile. The county, not the railroad, pays the increase.

The practical effect of this law has been to cause county officials to appear before the state board of equalization and protest against any increase in their valuations of railroads. The only attempt at uniform assessment all over the state has been made by holding assessors' conventions, and agreeing upon uniformity of valuation. The last time this was attempted the assessors were unable to agree, and as a result assessments are not now uniform. The state board of equalization took the figures of that faction which favored the higher assessment, and, as a result, counties which made the low assessment were mulcted for the difference.

The last legislature created a state tax commission, but its powers are wholly advisory. The commissioners are directed by statute to inquire into the valuation of property, corporate or otherwise, and to render all possible assistance to county taxing officials in arriving at true valuations; but they have no power to enforce one of their decisions, and assessors or county boards of equalization are at liberty to ignore their advice.

The tax commissioners are ex officio members of the state board of equalization, but their addition to that board in no way increases its powers. It merely makes the membership of the board six instead of three. The Secretary of State, the State Auditor and the Commissioner of Public Lands are the other members of the board.—*Spokane Spokesman*.

To Make Honest Conductors?

Some years ago an enterprising street railroad man in a paper read at a meeting of the Street Railway Association proposed as a means of insuring the collection of fares on street cars that each passenger be given a receipt which should entitle him to a chance in a lottery. It appears that in the City of Mexico this simple and ingenious scheme has now been put in use. The street railway company of that city has lately issued a circular, printed in Spanish, English and French, explaining the plan to the public and assuring passengers of a chance every month to draw a valuable prize worth from \$2.50 to \$1,000. The fares on the company's lines range from 3 cents to 30 cents, according to class and distance, and a 30-cent ticket gives a chance to a more valuable prize than a ticket costing less. The circular says:

There will be 200 cash prizes each month, representing a minimum total value of \$2,000, and a maximum total value of \$10,000, the exact amount depending upon the respective values of the checks drawing the prizes. The numbers of the winning checks will be announced in the winning cars and in various other ways immediately after the drawings, which will take place under government supervision at the company's offices at Indianilla within the first five days of the month following that during which the tickets are issued. In view of the benefits offered to its patrons under the new plan, the company requests their co-operation in carrying out its regulations.

The check issued by the conductor is not good for passage, but is intended solely as a receipt for the amount paid by the passenger, and will only be honored as such for a single trip on the car upon which it is issued. Failure on the part of the passenger to preserve the check and show it to the inspector upon demand will result in his being obliged to pay his fare a second time.

Taking Chances.

In watching the various accident reports issued by the Interstate Commerce Commission, it seems surprising, modern safety appliances being considered, that the accident and death list should continue so high.

Undoubtedly chance in one form and another will continue to be taken by railroad employees. The engineer will not fail to be in evidence who will take a chance to run for water or who may take a narrow chance to go one station farther to meet an opposing train, or may know that something has gone wrong with his engine but thinks she will hold together until he makes the next station.

In the days of the link and pin chances were continually taken by train and switchmen who would jump in front of a moving car to take out or insert a link. These men during switching service had a habit of waiting at the switch stand; after giving a "kick" signal for car or cars to reach them where cut was to be made, and while cars were moving anywhere from six to ten miles an hour, would run in between the cars and lift pin, jump out and signal engine men to stop or back up. It frequently happened that they never came out. Switchmen prided themselves on standing between the rails to mount an approaching car by grabbing the brake staff with their hands and stepping on brake beam.

Laws have been enacted compelling the adoption of modern safety appliances. The railroads at an enormous expense have adopted the vertical plane coupler, grab irons and the air-brake and the results are what? Go into a large yard to-day and watch present methods. If you have not followed the business since the

adoption of the safety devices you may look for a radical change. You may think that the cause which tempted men to take chances in past days could not possibly be in evidence now; and what do you find? * * * Watch those cars coming, there is a coupling to make, both knuckles are closed, one at least must be opened; see the switchman—for some reason he does not want the knuckle on the standing car opened but must have the one on the moving car adjusted. See, he runs almost backward in front of the car in motion while he raises knuckle pin with his left and pulls out knuckle with his right. You instinctively shudder at the chance he is taking and would not be surprised in the least to see disaster overtake him.

Here is another crew—let us watch operations. Cars have pulled over switch, "kick" and signal is given; when the proper place for cutting train arrives, switchman grabs pin lifting lever and finds it out of order; and then regardless of the fact that the cars are now moving anywhere from six to ten miles an hour, he jumps in between the moving cars and raises by hand one or the other of the knuckle pins. The adoption of the vertical plane coupler has removed only partially the causes which led men to trifle with fate. Our boys continue to go down and under, the greater number of the disasters being directly due to the want of prudence and common sense on the part of the employees themselves.

I make it a rule to never allow a trainman to take any chances, if in my power to prevent it. I never would take a "kick" signal until I was positive the pin was pulled, and my fireman was so instructed; no man ever got the chance to show off by stepping on the footboard of my locomotive, if I saw him in time to reduce speed.

I may be egotistical in mentioning this, but there is nothing in my past life that I am quite so proud of, and my object in mentioning it here is to influence some of my Brothers who are not doing what they might to prevent injury and death to their brother workmen.

The various brotherhoods should make united effort to prevent needless sacrifice of life and limb. Why not have something like the following in our obligations:

"I promise fealty to the company that gives me employment and will not at any time take a needless, reckless risk, * * *"

If the trainmen and switchmen will pardon the suggestion, I would advise that they incorporate something similar to the following:

"I promise that I will do all in my power to promote the best interests of the company; under no consideration will I run in front of a moving car to adjust coupler, nor for any other purpose; nor will I run between moving cars to lift a pin. * * *"—J. W. Reading in *Locomotive Engineers' Journal*.

Ginger on the B. & O.

The Baltimore & Ohio has a new press agent. It has also a ginger jar, whether new or old is not stated. The trains by which the company takes freight from New York to Chicago in 60 hours are now making their time with the regularity of a clock; and the press agent says that "the ginger jar of the management is large enough to afford intermediate cities the same despatch, so that Baltimore, Washington, Pittsburg, Wheeling, Columbus, Cleveland, Cincinnati and St. Louis share in the benefit enjoyed by New York shippers."

All these beneficiaries are greatly elated, he says. On west-bound shipments this hilarity may be all right; or, at any rate we shall find no fault; but if the traffic men, or the shippers, are inclined to joyousness in connection with fast time eastbound we beg them to consider the interests of the slow freight. One agent, bemoaning the costliness of 60-hour trains and the needlessness of such strenuous life, asserted recently that whole train loads of valuable slow freight (secured by himself, no doubt) had to languish unnumbered hours on side tracks for no other purpose than to let "a cheese and a side of beef rush by."

New Express Locomotive for the L. & N.-W.

The London & North-Western Railroad, under the sway of Mr. F. W. Webb, was the home, if not the cradle, of the compound locomotive. But now all is changed. His successor, Mr. George Whale, now Chief Mechanical Engineer, has quickly swung the pendulum the other way. Compounds are being scrapped by the score, and, in the case of some mineral engines, have been converted to simple locomotives.

On taking office Mr. Whale promptly produced express locomotives of the 4-4-0 type, simple in steam expansion and of a simple, straight design. These at once proved themselves a great success, and have been and are being multiplied rapidly—to the greater punctuality of the services and to real economy—since they are beginning to take away that old reproach of the L. & N.-W., that all its principal trains were double-headed. Mr. Whale has now gone a step further and tackled the problem of the northern division of the main line, whereon the heavy West Coast expresses climb over Shap to the frontier city of Carlisle. This section of 141 miles between Preston and Carlisle is almost of mountain grade in character. Hitherto, from time immemorial, the express trains in both

directions hereon have been piloted. Mr. Whale, determining to stop this wasteful method, has designed a locomotive of the 4-6-0, or 10-wheel type, with simple 19-in. x 26-in. cylinders, moderate driving wheels, and a large boiler, so as to get a good tractive effort and ample staying power. The first of this class has been undergoing severe tests with marked success.

Passes.

Members of the Cabinet, Senators and members of the House of Representatives do not take kindly to the manner in which Secretary of the Navy Bonaparte announced that he would not accept railroad passes. The announcement was made in a formal manner at the Navy Department, as if it were a radical departure for a government official to refuse free transportation from railroads. It is regarded by some as a reflection upon government officials generally. The fact is that in recent years few government officials have been accepting railroad transportation. The pass evil does not exist to anything like the extent the public at large believes. Members of the Cabinet rarely accept transportation, even when it is proffered by railroad companies.—*New York Globe*.

Sioux City, Iowa, July 23.—Shippers and business men who declined to go to Washington last spring and testify for the railroads in the congressional hearing on railroad rates are now being punished. A general wall is arising from Missouri valley points that all transportation "courtesies" have been cut off from those who did not manifest satisfactory interest in the welfare of the railroads. Until two months ago railroads were unusually liberal. Passes were obtained by all shippers of consequence and others influential in their communities, many being issued through the legal departments. But now those who openly favored railroad legislation or took a neutral stand have received requests to return annuals, if they possessed them, or have received curt refusals to issue transportation.—*Press Despatch*.

The Hall Road Collision.

In the accident at this place on the Liverpool-Southport branch of the Lancashire & Yorkshire July 27 (reported in General News Section, Aug. 4, page 35), 20 persons were killed and three injured. The 6.30 p.m. express from Liverpool to Southport, after passing through Hall Road Station, was, owing to an error on the part of the signalman, diverted on to a siding in which stood a train of five empty cars. The bodies of the last car of the standing train, and the front car of the express were completely demolished. The trucks of the leading (motor) car of the express were driven under the frames of the rear (motor) car of the standing train, and the trucks of this car were, in their turn, forced beneath the next car of the same train. The rolling stock of both trains was, apart from the leading car of the express and the last car of the standing train, practically intact.

The confession of Signalman Boote removes any doubt as to the cause of the accident. Immediately before the passing of the express, an empty train had been run on to the middle siding. Through forgetfulness, the signalman omitted to reset the switch for the main track. The station is controlled by two home and two distant signals, worked by levers numbered consecutively from 37 to 40, and the lever giving admittance from the main line to the middle siding is numbered 23. On the approach of the express, the signalman lowered the outer home signal, but found the inner home signal (lever 37) immovable, owing to its being interlocked with the siding lever. Forgetting that the latter (lever 23) was still in position to admit an incoming train to the siding, he came to the conclusion that lever 37 was out of order, and signalled with a green flag for the train to come on, thus bringing about the collision. Boote had been a signalman 18 months and an employee of the company 17 years.

English Motor Omnibuses.

On July 28th the North Eastern Railway bill authorizing, among other things, running powers for motor omnibuses, coaches, etc., for the conveyance of passengers, luggage, parcels, merchandise and goods, and providing that the local authority may from time to time prescribe the route to be taken, was passed by the Select Committee of the House of Lords for third reading. Sir George Gibb, General Manager, showed that there was a considerable demand for the proposed service.

Atmosphere Damaged by Bill Gates.

Engineer William H. Gates tore some holes in the atmosphere as he neared Fort Wayne yesterday, hauling No. 28, the Pennsylvania Special eastbound. This train has had a wonderful record between Chicago and Fort Wayne. It has come into the station here one or two minutes ahead of time each day without exception since it was put on the road nearly two months ago. Gates is not the man to let such a record as this spoil on his hands. At Larwill, only 28 miles from Fort Wayne, circumstances over which the engineer had no control, caused the train to be four minutes behind its schedule. This with a schedule of 60 miles an hour and so short a distance to run, might seem hopeless, but Gates "turned her loose" and the 28 miles were covered in 23 minutes, and the Pennsylvania Special hit the Calhoun street crossing exactly two minutes ahead

of time. From CU tower, west of Larwill, to Coesee, 5.2 miles, the time was three minutes. When asked about his fast run, Mr. Gates' reply was characteristic. "Well, I came in on time, didn't I? That's all I'm there for. I'm not looking for any records. Couldn't tell you anything about it, anyhow, because I lost my watch in Chicago." —*Fort Wayne Journal*, July 27.

Increase of Wages on the Burlington.

The locomotive firemen of the Burlington road have received an increase in wages, and, according to the *Dubuque Journal*, the rates are now the best in the United States. Following the meeting with the officers of the road at which the increase was granted, the Chairman of the Firemen's Brotherhood received from his fellow members the present of a diamond shirt stud. The schedule as published by the *Dubuque Journal* is as follows:

The scale of wages on the Class A engines was increased from \$2.40 to \$2.60 per hundred miles; Class K-3 and K-7 engines from \$2.80 to \$2.95 per hundred miles. All group four freight engines when run in the passenger service have been increased from \$2.55 to \$2.75 per hundred miles. Watching engines will pay \$2.40 for 10 hours' work instead of \$1.55.

Firemen running on construction trains instead of receiving \$2.40 a day regardless of class of engines, will receive pay according to the class of engine on which they run. Group one will pay \$2.40 a day, group two \$2.60, group three \$2.75, and group four \$3.05. When more than a hundred miles is made in a day freight rates will be paid.

A new rate when operating unloading machines of 30 cents an hour was established; also a rate of 21 cents instead of 20 cents an hour for running on the large class switch engines. A new rule for helper service is established in which firemen on helper engines shall be paid according to rate and classification on the basis of a 12 hour day.

Manufacturing and Business.

The Lackawanna Bridge Co., of Scranton, Pa., capital \$200,000, has been chartered in Pennsylvania. W. L. Connell, of Scranton, is president.

Mr. W. V. Kelley has been elected President of the American Steel Foundries, succeeding General Charles Miller, who continues Chairman of the Board of Directors.

Mr. Charles Parsons, of Chicago, well known in the pneumatic tool business, is now associated with the Independent Pneumatic Tool Co., and will travel out of Chicago.

The Watson-Stillman Co., New York, state that they are now making upwards of 300 different styles of hydraulic jacks, the cylinders and rams of which are all made from solid forgings.

The Sullivan Machinery Co., Chicago, has recently shipped to the Isthmian Canal Commission at Colon, Canal Zone, Panama, 25 3¼-in. rock drills fitted with the new Sullivan tappet valve.

The M. Mithskun Co., Detroit, Mich., have just completed a combination car for the New Orleans, Natalbany & Natchez R. R. It has three compartments, one for baggage, one for colored people and one for white people.

The Morse Chain Company, Trumansburg, N. Y., is now building at Ithaca, N. Y., a plant of about five times the present capacity. The plant was originally started in 1898, to make bicycle chains. In 1901 it brought out the present high speed silent running chain, and since that time has had a rapidly growing business. In the line of power transmission The Morse Company has in service chains transmitting over 75,000 h.p., and is furnishing drives up to 500 h.p. for a single transmission. F. L. Morse is Treasurer and General Manager.

Iron and Steel.

The Pennsylvania Steel Co. has been awarded the contract for the superstructure of the new Manhattan bridge over the East river, which calls for about 43,000 tons of steel.

The Harriman Lines have ordered 10,000 tons of rails from the Carnegie Steel Co. in addition to the 16,000 tons recently bought in Colorado. Other large inquiries for rails are in the market for both 1905 and 1906 delivery, aggregating about 200,000 tons. The Tidewater Railroad, which recently inquired for 20,000 tons of rails, is about to buy 500 tons.

PERSONAL.

—Mr. H. B. Hunt, who recently resigned as Assistant Mechanical Superintendent of the Erie, has become General Inspector with the American Locomotive Co., with office at Schenectady, N. Y.

—Mr. C. H. Prescott died in Portland, Ore., on August 7. Mr. Prescott was born in 1839 and since 1869 has filled various railroad offices, having been Auditor and Cashier of the Missouri River, Fort Scott & Gulf; Manager of the Oregon Railroad & Navigation Company, and Second Vice-President of the Northern Pacific. When

the last named road went into the hands of a receiver in 1893, Mr. Prescott was appointed Receiver of the Western division.

—Mr. W. S. Wilson, President of the Philadelphia, Germantown & Norristown, died on August 3. Mr. Wilson was born in 1825 and has spent most of his life in railroad work. In 1853 he was made Superintendent of the Chester Valley, and in 1858 Secretary and Treasurer of the Philadelphia, Germantown & Norristown, later becoming Superintendent of that railroad. In 1870 he was appointed Purchasing Agent of the Philadelphia & Reading, holding that position for 15 years.

—Mr. H. P. Meredith, who has been appointed Assistant Engineer of Motive Power of the Pennsylvania at Altoona, began railroad service on that road in 1897 as an apprentice in the Sunbury shops. He completed his course as an apprentice in July, 1901, and in the latter part of that year inspected locomotives being built for the Pennsylvania Company. In January, 1902, he became Motive Power Inspector of the Buffalo & Allegheny Valley division, and a year later was appointed Assistant Master Mechanic at Altoona, being promoted to his present position on July 1, 1905.

—Mr. Eliot Sumner, Assistant Engineer of Motive Power of the United Railroads of New Jersey division of the Pennsylvania, at Jersey City, began railroad service as a special apprentice in the Altoona shops in September, 1896. He was made inspector of the West Philadelphia shops on Feb. 1, 1901, and Assistant Master Mechanic of the Renovo shops in October of that year. In December, 1902, he was appointed Assistant Engineer of Motive Power of the Buffalo & Allegheny Valley division, at Buffalo, and in November of the next year, Assistant to the General Superintendent of Motive Power at Altoona, where he remained until appointed to his present position.

—Mr. George P. Smith, who has been appointed Chief Engineer of the Lake Erie & Western and the Indiana, Illinois & Iowa, with headquarters at Indianapolis, Ind., was born March 7, 1859, at South Deerfield, Mass. He graduated from the Institute of Technology at Worcester, Mass., in 1885, and entered railroad service in 1886 with the Burlington & Missouri River as draughtsman in a locating party. In April, 1887, he went to the Boston & Maine, where he remained nine years. He then entered private business as draughtsman, returning to railroad service in 1897 as Chief Engineer on the St. Joseph & Grand Island. He held this position until October, 1900, when he went to the Lake Shore & Michigan Southern as Principal Assistant Engineer. In April, 1902, he was promoted to be Engineer of Maintenance of Way on the Indiana, Illinois & Iowa, which position he held until appointed to his present post.

—Mr. B. B. Kelliher, who has been appointed Chief Engineer of the Grand Trunk Pacific, with office at Montreal, Que., was born in Ireland, Dec. 26, 1862. He attended Dublin University and then served as apprentice to a civil engineer in Dublin. His principal work in Ireland consisted of surveys for the Mitchelstown & Fermoy and the Galway & Clifton railroads and improvements of the Barrow river. In 1886 he came to the United States and entered the employ of the Union Pacific. He remained with that company for four years and then went to the Northern Pacific as Assistant Engineer, remaining with that company until 1896, the greater part of the time being in charge of the Cascade and Pacific divisions. He then went to the Anaconda Copper Company's mines in Butte, Mont., as Mining Engineer, and in 1897 went to the Oregon Short Line, where he remained until 1903 as Division Engineer, when he resigned to become Resident Engineer, in charge of location, on the Denver, Northwestern & Pacific. He went to the Grand Trunk Pacific in January, 1904. He was soon made Division Engineer at Winnipeg, where he remained until appointed to his present position.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—W. C. Barrett, Assistant Engineer of the Monongahela division, has been transferred to the same position on the Newark division, with headquarters at Newark, Ohio. F. H. Koppes, assistant on the engineering corps of the Pittsburg division, succeeds Mr. Barrett, with headquarters at Grafton, W. Va.

Boston & Maine.—S. R. Arey, General Foreman of the Salem shops, has resigned, effective September 1.

Central Vermont.—Robert F. Burnap has been appointed General Freight Agent, with headquarters at St. Albans, Vt., succeeding J. E. Dalrymple, resigned.

Chicago & North-Western.—E. E. Betts is now Car Service Agent. He succeeded W. P. Marsh.

Chicago Great Western.—W. E. Pinckney has been appointed General Freight Agent, succeeding S. E. Stohr, resigned.

Chicago, Milwaukee & St. Paul.—J. R. Bryce has been appointed Freight Auditor, succeeding F. B. Warner, resigned.

Chicago, Rock Island & Pacific.—C. W. Jones has been appointed

Superintendent of the Iowa division, succeeding J. B. Smalley, transferred.

F. T. Dolan has been appointed General Superintendent of the Southwestern District, with headquarters at Topeka, Kan., succeeding J. O. Crockett, resigned.

Cincinnati, Hamilton, & Dayton.—J. W. Connaty, Master Mechanic at Indianapolis, has resigned. E. E. Chrysler succeeds Mr. Connaty.

Columbia River & Northern.—Marcus Talbot, Assistant General Agent of the Pacific Coast Steamship Co., has been appointed Vice-President and General Manager of the C. R. & N., succeeding H. C. Campbell.

Detroit, Toledo & Ironton.—W. L. Greenhalgh, formerly Auditor and Assistant Treasurer of the Ann Arbor, has been appointed Assistant Treasurer, with headquarters at Toledo.

Grand Trunk.—John Pullen has been appointed Assistant Freight Traffic Manager, with headquarters at Montreal. J. E. Dalrymple, General Traffic Agent of the Central Vermont, has been appointed General Freight Agent of the G. T., with headquarters at Montreal.

Hocking Valley.—C. A. Seydam, Paymaster, has resigned to become Secretary and Treasurer of the Sunday Creek Coal Co. John M. McFadden succeeds Mr. Seydam.

International & Great Northern.—George D. Hunter, City Passenger and Ticket Agent, has been appointed Assistant General Passenger Agent, with office at Palestine, Tex.

Minneapolis & St. Louis.—John I. Dille, Assistant General Counsel of the Chicago, Rock Island & Pacific, has been appointed General Attorney for the Minneapolis & St. Louis and the Iowa Central, succeeding A. E. Clarke.

Minneapolis, St. Paul & Sault Ste. Marie.—Edmund Pennington, Second Vice-President, has been elected First Vice-President, succeeding John Martin, deceased. W. L. Martin, Freight Traffic Manager, has been elected a Director and Second Vice-President.

Mississippi Valley & Gulf.—W. I. Allen has been elected President; Theodore Rockenfeller, Vice-President, and E. L. Cochanour, Secretary and Treasurer of this new road.

Missouri Pacific.—Captain Wilkie Woodard has been appointed Chief Assistant Construction Engineer.

New York State Railroad Commission.—John S. Kennedy, of Corning, has been appointed Secretary of the commission.

Northern Pacific.—James N. Hill has been elected Vice-President, succeeding Daniel S. Lamont, deceased.

Pullman Company.—E. G. Kirk has been appointed District Superintendent at Buffalo, succeeding J. K. Bennett, deceased. Mr. Kirk formerly was assistant to Mr. Bennett.

St. Louis, Iron Mountain & Southern.—Hugh Wilson has been appointed Superintendent of the White River division, with headquarters at Aurora, Mo., succeeding O. M. Sewell, resigned.

San Pedro, Los Angeles & Salt Lake.—A. Waldbauer, formerly City Passenger Agent in New York for the Grand Trunk, has been appointed Traveling Freight and Passenger Agent, with headquarters in New York.

Southern Pacific.—C. C. Mallard, Assistant Superintendent of the Louisiana Western division, with headquarters at Lafayette, La., has resigned. G. C. Scarlett, Chief Dispatcher, succeeds Mr. Mallard.

Thomas Ahern, Roadmaster of the Oakland division, has been appointed Assistant to the District Engineer of Maintenance of Way at San Francisco. He will act as General Track Superintendent and have supervision of important track improvements, betterments and additions.

Wabash.—T. J. Tobin, Assistant Auditor, has been appointed Auditor, with headquarters at St. Louis, Mo., succeeding D. B. Howard, resigned on account of ill health.

LOCOMOTIVE BUILDING.

The Pittsburg, Cincinnati, Chicago & St. Louis is in the market for some consolidation locomotives.

The Kansas City Southern has ordered 12 freight and eight switching locomotives from the American Locomotive Co.

The New York Central & Hudson River has ordered 35 electric locomotives from the General Electric Co. and the American Locomotive Co. jointly.

The Lehigh & New England has ordered three simple consolidation (2-8-0) locomotives from the Baldwin Locomotive Works, for August delivery. These locomotives will weigh 70 tons, with 60 tons on the drivers; cylinders, 20 in. x 24 in.; diameter of drivers, 50 in.; straight boiler, with a working steam pressure of 200 lbs.; 248 tubes, 2 in. in diameter and 13 ft. 4½ in. long; firebox, 96 in. x 66 in.; grate area, 44 sq. ft.; tank capacity, 4,000 gallons, and coal capacity, 10 tons. The special equipment includes: Westinghouse air-brakes, Gould couplers, Star headlights, Ohio injectors, Brady journal bearings, Crosby safety valves and steam gages, Leach sanding devices, Nathan sight-feed lubricators and Baldwin springs and wheel centers.

The Norfolk & Western has ordered five simple Pacific (4-6-2) locomotives from the American Locomotive Co. These locomotives will weigh 194,000 lbs., with 126,000 lbs. on the drivers; cylinders, 20 in. x 28 in.; diameter of drivers, 68 in.; radial stay wagon top boiler, with a working steam pressure of 200 lbs.; heating surface, 3,474 sq. ft.; 280 charcoal iron tubes, 2¼ in. in diameter and 20 ft. 1 in. long; firebox, 8 ft. 3 in. long and 5 ft. 4¼ in. wide; grate area, 45 sq. ft.; tank capacity, 6,000 gallons, and coal capacity, 10 tons. The special equipment includes: Westinghouse air-brakes, Pyle-National electric headlights, Monitor injectors, U. S. metallic piston and valve rod packings, Ashton safety valves, Leach sanding devices, Nathan sight-feed lubricators, Railway Steel Spring Co.'s springs, Ashton steam gages and Latrobe driving and truck wheel tires.

The Lehigh Valley has ordered four simple eight-wheel switching (0-8-0) locomotives from the Baldwin Locomotive Works. These locomotives will weigh 172,000 lbs.; cylinders, 21 in. x 28 in.; diameter of drivers, 55½ in.; straight boiler, with a working steam pressure of 200 lbs.; heating surface, 2,248 sq. ft.; 274 charcoal iron tubes, 2 in. in diameter and 14 ft. 6½ in. long; wide carbon steel firebox, 114½ in. x 96 in.; grate area, 76.3 sq. ft.; tank capacity, 6,000 gallons, and coal capacity, eight tons. The special equipment includes: Westinghouse air-brakes, Snow bell ringers, Diamond special brake-beams, Tower couplers, Glazier headlights, Hancock injectors, Magnus Metal Co.'s journal bearings, U. S. metallic piston and valve rod packings, Consolidated safety valves, Leach sanding devices, Detroit sight-feed lubricators, Ludlum springs, Ashcroft steam gages and Latrobe driving wheel tires.

The Newton & Northwestern has ordered one simple eight-wheel (4-4-0) locomotive and one simple 10-wheel (4-6-0) locomotive from the American Locomotive Co. The eight-wheel locomotive will weigh 43 tons, with 27½ tons on the drivers; cylinders, 17 in. x 24 in.; diameter of drivers, 62 in.; wagon top boiler, with a working steam pressure of 160 lbs.; heating surface, 1,232 sq. ft.; 186 tubes; firebox, 72 in. x 34 in.; grate area, 17 sq. ft.; tank capacity, 3,500 gallons, and coal capacity, eight tons. The 10-wheel locomotive will weigh 55 tons, with 44 tons on the drivers; cylinders, 18 in. x 24 in.; diameter of drivers, 50 in.; wagon top boiler, with a working steam pressure of 160 lbs.; heating surface, 1,500 sq. ft.; 218 tubes; firebox, 96 in. x 34½ in.; grate area, 23 sq. ft.; tank capacity, 4,000 gallons, and coal capacity, eight tons. The special equipment for both includes Westinghouse air-brakes.

CAR BUILDING.

The Erie is in the market for 500 box cars.

The Southern is in the market for 300 dump cars.

The Georgia Central has asked bids on 500 box cars.

The Dominion Coal Company has ordered 150 steel coal cars.

The Texas Central has ordered two passenger cars from F. M. Hicks & Co.

The Cuba Company has ordered 300 flat cars from the Middletown Car Works.

The Alabama & Vicksburg has ordered 60 ballast cars from the Rodger Ballast Car Co.

The Great Northern is reported to have ordered one sleeping car from the Pullman Co.

The Seaboard Air Line is in the market for 500 plain box cars and 500 ventilated box cars.

The Muncie & Portland Traction Company, of Portland, Ind., is in the market for 10 passenger cars.

An Argentine Railroad has ordered from the Middletown Car Works 10 steel underframe ballast cars.

The Spokane & International has ordered 102 freight cars for construction work from Haskell & Barker.

The United Railways of Havana is in the market for 325 freight cars. G. Amsinck, of New York, is the agent.

The New York Central & Hudson River has ordered 175 electric steel cars from the American Car & Foundry Co.

The Panama is reported to have ordered 600 box cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The Georgia, Florida & Alabama is in the market for 40 flat cars and 50 box cars. These cars are to be of wood.

The Kansas City Southern is in the market for 600 box cars of 80,000 lbs. capacity and 100 stock cars of 60,000 lbs. capacity.

The Lake Shore & Michigan Southern is reported to have ordered three combination coach and dining cars from Barney & Smith.

The Carnegie Steel Company has ordered 100 Summers dump cars from the American Car & Foundry Co. Barber trucks will be used.

The Nipe Bay Company, Cuba, has ordered 150 20-ton sugar cane cars from the Middletown Car Works. The order came through Hugh Kelly & Co.

The DeQueen & Eastern has ordered 18 logging flat cars of 60,000 lbs. capacity from the American Car & Foundry Co. These cars will be 40 ft. long and 9 ft. wide, outside measurements. The special equipment includes: Damascus brake-beams and Tower couplers.

The Deepwater Ry. has ordered 110 box cars of 80,000 lbs. capacity from the Western Steel Car & Foundry Co. The special equipment includes: Bettendorf bolsters, Major couplers, Westinghouse draft rigging, McCord journal boxes, Murphy roofs and Griffin wheels.

The Richmond, Fredericksburg & Potomac has ordered four 60-ft. baggage and express cars from the American Car & Foundry Co. for December delivery. The special equipment includes: Westinghouse air-brakes, Gold steam heating system and Pintsch gas light.

The Missouri, Oklahoma & Gulf has ordered 10 box cars of 80,000 lbs. capacity from the American Car & Foundry Co. for October delivery. The inside dimensions of these cars will be 36 ft. long, 8 ft. 6 in. wide and 8 ft. high. Special equipment consists of Diamond brake-beams, Miner draft rigging and Chicago roofs.

The Boston & Maine has ordered 40 American R. R. Association standard box cars of 60,000 lbs. capacity from the Laconia Car Co. The special equipment includes: Simplex bolsters, Westinghouse air-brakes, Gould couplers, Miner draft rigging, Sherwin-Williams paint, Murphy roofs, Fox pressed steel trucks and Laconia wheels.

The Central of New Jersey has ordered 100 refrigerator cars of 60,000 lbs. capacity from the Standard Steel Car Co., for immediate delivery. These cars will weigh 45,000 lbs., and measure 36 ft. long, 8 ft. 4 in. wide and 7 ft. 5½ in. high, all inside measurements. The special equipments include: Westinghouse air-brakes, Kelso couplers, Miner draft rigging and Hutchins roofs.

The Chesapeake & Ohio, as reported in our issue of August 11, has ordered 500 box cars of 80,000 lbs. capacity from the American Car & Foundry Co. These cars will weigh 36,000 lbs., and measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, all inside measurements. The special equipment includes: Monarch brake-beams, Westinghouse air-brakes, Miner tandem draft rigging and Murphy roofs.

The Lehigh Valley has ordered 100 refrigerator cars of 50,000 lbs. capacity from the Standard Steel Car Co. These cars will weigh about 45,000 lbs., and measure 36 ft. long, 8 ft. 4 in. wide and 7 ft. 5½ in. high, all inside measurements. The special equipment includes: American Steel Foundries bolsters, Standard Steel Car Co.'s brake-beams, Westinghouse air-brakes, Kelso couplers, Miner draft rigging, Hutchins roofs and Diamond arch-bar trucks.

The Atlantic Coast Line has ordered 75 self-clearing hopper bottom drop covered gondola cars of 80,000 lbs. capacity from the Middletown Car Co. These cars will weigh 45,000 lbs., and measure 32 ft. 2 in. long and 9 ft. ½ in. wide. The special equipment includes: American Steel Foundries bolsters, Atlantic Coast line standard brake-beams, Christie brake-shoes, Westinghouse air-brakes and draft rigging, Tower couplers and Harrison dust guards.

The Harriman Lines, as reported in our issue of August 11, have ordered 1,250 box and 300 stock cars for the Southern Pacific, 1,100 box cars for the Union Pacific, 200 box and 100 stock cars for the Oregon R. R. & Navigation Co. from the Western Steel Car & Foundry Co.; 1,000 box and 100 flat cars for the Southern Pacific, 500 box cars for the Union Pacific, and 100 flat cars for the Oregon R. R. & Navigation Co. from the American Car & Foundry Co.; 300 gondola cars for the Oregon Short Line and 250 gondola cars for the Union Pacific from the American Car & Foundry Co. and the Pressed Steel Car Co. All box cars will be of 100,000 lbs. capacity, will weigh 40,339 lbs., and measure 40 ft. long, 8 ft. 6 in. wide and 8 ft. high, all inside measurements. All gondola cars will be of 100,000 lbs. capacity, weigh 40,170 lbs., and measure 40 ft. 4 in. long, 9 ft. 5 in. wide and 4 ft. 6 in. high, all inside measurements.

All stock cars will be of 80,000 lbs. capacity and measure 36 ft. 6 in. long, 8 ft. 5½ in. wide and 8 ft. high, all inside measurements. All flat cars will be of 100,000 lbs. capacity, weigh 34,500 lbs., and measure 40 ft. 10 in. long and 9 ft. ⅝ in. wide. The special equipment for all includes: Simplex Railway Appliance Co.'s bolsters, Damascus brake-beams for box and stock cars, Christie brake-shoes, New York air-brakes, Hewitt Manufacturing Co.'s brasses, Climax couplers, Miner tandem draft rigging, National Malleable Castings Co.'s journal boxes and Railway Steel Spring Co.'s springs for stock and flat cars.

BRIDGE BUILDING.

BANGOR, ME.—A contract has been given by the Maine Central to the American Bridge Co. to build a steel bridge over the Kenduskeag river.

BERWICK, PA.—A contract has been given to M. H. Stebbins at about \$45,000 for work on the substructure of the bridge to be built between this place and Nescopeck.

BESSIE, OKLA. T.—Bids are wanted September 1 by W. B. Tharrington, County Clerk, Cordell, Okla. T., for building a steel bridge 100 ft. long over the Washita river, in Washita County.

ELRENO, OKLA. T.—The Chicago, Rock Island & Pacific is locating the site for a new iron bridge over the Canadian river near this place.

KANSAS CITY, Mo.—An officer writes that work has been postponed on the proposed steel bridge to be built by the Chicago, Rock Island & Pacific over the Caw river at Kansas City avenue in Armourdale.

MAIDEN, VA.—The Chesapeake & Ohio, it is reported, will build a bridge over the James river at this place.

MIFFLINVILLE, PA.—Bids will soon be asked for building the new State street bridge at this place, to cost about \$45,000.

NASHVILLE, TENN.—A bridge will be built over the Cumberland river at this place. Albert B. Tavel is Chairman of the bridge committee.

NEOSHO, Mo.—Bids are wanted September 4 by John M. Sherwood, Bridge Commissioner, for putting up a two-span steel bridge with a total length of 148 ft. over Indian Creek road, in Newton County.

NEW YORK, N. Y.—Bids for the steel work of the Manhattan bridge to be built over the East river between the boroughs of Manhattan and Brooklyn, were opened last week by Commissioner of Bridges George E. Best. The bids were as follows: Pennsylvania Steel Co., \$7,284,739; John Pierce Co., \$7,486,491; Milliken Bros., \$7,893,970; R. H. Hood Co., \$7,956,712; King Bridge Co., \$9,312,940. The contract, which calls for the furnishing and placing of 43,000 tons of steel has been let to the Pennsylvania Steel Company. The work is to be completed by January 1, 1909.

PEORIA, ILL.—The City Council has decided to ask competitive plans for a low level bridge over the Illinois river at Bridge street. The bridge will be built of steel or reinforced concrete and will be 40 ft. wide, with 6-ft. sidewalks and with either a bascule, trunnion or lift span. D. H. Roberts is Assistant City Engineer.

PROVO, ARK.—The De Queen & Eastern Railroad, which is building a road between this place and Hot Springs, will shortly begin the construction of a large bridge over the Saline river.

SHAMOKIN, PA.—A bridge is proposed to be built over Carbon Run creek in Coal township.

SHERMAN, TEX.—An officer writes that the Houston & Texas Central will build, with its own forces, the following steel bridges at an aggregate cost of \$50,000, between the towns of Palmer and Trumbull over Red Oak creek, 100 ft. long; one between Howe and Sherman over the east fork of Trinity river; one over Post Oak creek and one about 129 ft. long over Choctaw creek.

STANISLAUS, CAL.—Plans are being made by County Surveyor A. L. Finny for building a concrete bridge to consist of two arches each 100 ft. long, to cost about \$24,500, for which bids will be asked as soon as plans are completed.

Other Structures.

BELLEFONTAINE, OHIO.—The Cleveland, Cincinnati, Chicago & St. Louis will, it is said, increase the size of its shops at this place.

CORBIN, KY.—The Louisville & Nashville will spend about \$200,000 in improving its facilities at this place. The work includes the building of a roundhouse to hold 28 locomotives.

CROOKSTON, MINN.—The Great Northern has plans ready for putting up a brick and stone building, 32 x 92 ft., to hold its division offices.

HARRISBURG, PA.—The Pennsylvania has secured 51 acres of land as a site for additions to its shops and a new roundhouse, for which contracts have been let to J. N. Bastress & Co. and H. E. Aherns & Bro.

LEXINGTON, KY.—The Chesapeake & Ohio and the Louisville & Nashville, it is said, will jointly build a union passenger station to cost \$20,000.

MARICOPA, ARIZ.—The Southern Pacific is having plans made for putting up a brick station to cost about \$50,000.

MINGO JUNCTION, OHIO.—The Cleveland & Pittsburg is planning to spend about \$25,000 in improvements to include a roundhouse to hold 40 locomotives.

NEW PHILADELPHIA, OHIO.—A contract has been given by the Baltimore & Ohio to the Pittsburg Construction Co., of Pittsburg, Pa., for building a brick passenger station 20 x 70 ft.

OKLAHOMA CITY, OKLA. T.—The Oklahoma Terminal Association has been formed with a capital of \$150,000 to build a union passenger station to be used by all the roads entering the city.

OWENSBORO, KY.—The Louisville, Henderson & St. Louis, the Illinois Central and the Louisville & Nashville have agreed to jointly build a brick union passenger station.

PALATKA, FLA.—The Atlantic Coast Line and the other roads entering this city will enlarge the present passenger station or put up a new union station.

ROANOKE, VA.—The Norfolk & Western, it is said, will increase its shops at this place to double their capacity.

ST. THOMAS, ONT.—The Michigan Central is to spend \$100,000 improving its shops at this place.

TURCOT, QUE.—The Grand Trunk is putting up a 40-stall roundhouse with its own forces at this place.

WINCHESTER, KY.—The Louisville & Nashville and the Chesapeake & Ohio, it is said, will jointly put up a \$16,000 union passenger station this fall.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

CANADIAN PACIFIC.—An officer writes, in connection with the extensions of present lines, that a contract has been let to J. D. McArthur, of Winnipeg, for the extension of the Teulon branch 10 miles north from Teulon towards Icelandic river. It is expected that this work will be completed within two or three months.

CANANEA, YAQUI RIVER & PACIFIC.—The concession which has been granted this road by the Mexican Government, has been amended so as to authorize the building of a number of branch roads. The most important branches proposed are those to connect with the Sonora branch of the Southern Pacific, with the Mexican Central and with the Rio Grande, Sierra Madre & Pacific. (May 26, p. 174.)

CHICAGO & ALTON.—An officer writes that this road has closed a contract for the grading of a new line from Springfield to Murrayville. The line will be known as the "Air Line" and will extend from the junction of the Wabash at Iles, just south of Springfield, for 35 miles towards Murrayville, shortening the distance to Kansas City about five miles. The ruling grade is .3 per cent. The company has also just closed the contract for 50 miles of second track from Bloomington to Sherman, Ill., which will complete the double tracking as far as Springfield.

CHICAGO GREAT WESTERN.—This company has secured options for a right of way from Talmage, a point on its Kansas City division in Union County, Iowa, west to Creston, a distance of about 14 miles. For a part of the distance the old Chicago, Burlington & Quincy roadbed, which was abandoned, can be used.

CHICAGO, ROCK ISLAND & PACIFIC.—It is reported that the survey recently made for about half of the distance between San Diego, Cal., and El Paso, Tex., was made by this company and that a road will be built between these points and operated in connection with the El Paso & Southwestern.

CEDAR CREEK.—A charter was granted at Harrisburg, Pa., last week to this company with a capital of \$60,000, to build six miles of railroad in Fayette and Westmoreland Counties. Charles Marshall Johnston, of Pittsburg, is President.

CENTRAL RAILWAY CO. (ELECTRIC).—This company was organized recently in Iowa with a capital stock of \$25,000, and with headquarters at Des Moines, for the purpose of constructing an electric line from Des Moines to Ames, Iowa, distance 37 miles, to parallel the line of the Northwestern between these two points. T. J. Wilcox, of Clinton, Ia., is president; L. E. Miley, of Chicago, Vice-president; B. S. McCully, of Princeton, Ia., Treasurer; D. L. Wilcox, of

Des Moines, secretary, and George H. Carr, of Des Moines, Attorney. Surveyors are now in the field locating the route for the proposed line. It is understood that arrangements have been made with the Interurban and the Des Moines City Railway Company for entrance into Des Moines over the tracks of the two companies.

COLORADO, TEXAS & MEXICO.—This company, which was projected some time ago and which graded about 25 miles of road, has, by vote at a recent meeting of its stockholders, decided to complete the road. The proposed route is from Washburn, in Armstrong County, Tex., southeast to Comfort, Tex., on the San Antonio & Aransas Pass, a distance of about 400 miles. The Chicago, Rock Island & Pacific, it is said, is largely interested in this project. (July 21, p. 23.)

COLUMBUS, MARION & BUCKEYE LAKE.—This company has been incorporated, with a capital of \$500,000, to build from Marion, Ohio, through the counties of Marion and Crawford to Bucyrus, Ohio, 17 miles. The incorporators are: John G. Webb, James B. Gormly, Frank L. Hopley, Oscar M. Gottschall and George Whysall.

GAINESVILLE & ATHENS CONSTRUCTION COMPANY.—Under this name, a company has been chartered in Georgia with a capital of \$150,000 to build railroads. It is understood that the company intends to build a railroad from Athens southwest to Gainesville, 30 miles. The headquarters of the company will be at Savannah. The incorporators include: T. M. Cunningham, Jr., W. V. Davis and W. M. Farr.

GAINESVILLE, WHITESBORO & SHERMAN.—Under this name, a company has been granted a charter in Texas with a capital of \$500,000 to build a railroad from Sherman, Tex., east via Whiteside to Gainesville, a distance of 32 miles. The incorporators include: G. A. Hassinger, H. H. Lazarus, of New Orleans; H. G. Stinnett, of Sherman; S. B. Cowell, of Whitesboro, and John King, of Gainesville.

GRAND TRUNK PACIFIC.—The company is asking for bids at its Montreal office for the construction of 275 miles of railroad west of Portage la Prairie. The surveys run across practically level prairie. (August 11, p. 28.)

GREEN BAY, OSHKOSH, MADISON & SOUTHWESTERN.—The Government has approved the application of this company for a right of way through the Menomonee, Stockbridge and Munsee Indian reservation, and construction will soon begin, it is reported. The revised route extends from Madison through Oshkosh to North Crandon, and not to Green Bay, as originally projected. (See Construction Record.)

GULF & NORTHWESTERN.—An officer writes that this company, which was incorporated in Texas some time ago, is now in a position to begin the early construction of its proposed road, and that contracts will shortly be let. The question of using steam or electricity has not been definitely decided. The proposed route is from Waco, Tex., northwest via Meridian and Stephenville to Thurbur, a distance of 110 miles. The work includes the building of seven bridges, one 400 ft. long and the others ranging from 50 to 100 ft. each, for which contracts will be let as soon as the surveys are completed. N. R. Morgan, Meridian, Tex., is Secretary. (See Construction Record.)

KNOXVILLE & AUGUSTA (SOUTHERN).—Announcement has been made by W. J. Oliver, of Knoxville, Tenn., who has the contract for building the entire 68 miles of this proposed road from Bushnell, N. C., to Maryville, Tenn., that work will be begun at once at Bushnell. Rights of way are being secured from that place to the Little Tennessee River. The proposed route extends west from Bushnell along the north fork of the Little Tennessee River for about 50 miles, thence northward to a connection with the Knoxville & Augusta at Maryville. About three miles of the line from Bushnell were graded two years ago. This extension will be a low-grade line and does not present any difficult features of construction. The surveys out of Bushnell, however, call for several tunnels.

LEXINGTON SOUTHERN.—A charter has been granted this company in Kentucky to build an electric railroad from Lexington, Ky., south to Nicholasville, as distance of 15 miles; also to operate a line to Camp Nelson and High Bridge. The headquarters of the company will be at Lexington, Ky. J. W. Stoll is President, and E. B. Ellis, Secretary and Treasurer.

LOUISVILLE & NASHVILLE.—This company, it is said, has given a contract to Dunno & Leland, of Birmingham, Ala., to build an extension 20 miles long from the Northern Alabama to the Vulcan mines in the Warrior field (Ala.) at an approximate cost of \$500,000. Work is to be commenced at once.

MINIDOKA & SOUTHWESTERN (OREGON SHORT LINE).—This branch of the Oregon Short Line, running from Twin Falls northeast to Minidoka, Idaho, about 45 miles through a rich agricultural country, has been opened for traffic.

MINNEAPOLIS & ST. LOUIS.—This company has completed a preliminary survey for a line from Des Moines, Iowa, in a southerly direction to Seymour, Iowa, where connection can be made with the Iowa Central. The route runs through Clarkson, Santa Fe, Dallas and Promise City, and the surveyors are now working south of Seymour with St. Louis as their objective point.

MISSOURI, KANSAS & TEXAS.—This company, it is said, has bought a large plot of ground near Rosedale, Kansas City, Mo., as a site for a new terminal yard. The proposed yard will have 14 tracks each 3,000 ft. long. A 10-stall brick roundhouse will also be built.

NEW JERSEY ROADS (ELECTRIC).—Plans are being made by a number of Essex County capitalists to build electric roads from Millville, paralleling the West Jersey & Seashore, through Port Elizabeth, Dorchester, Leesburg, Delmont, Eldora, Dennisville, Seaville and Oceanview to Sea Isle City, with a branch from Dennisville to Goshen, Cape May Court House, Green Creek, Bennett and Cape May City; also for a road from Millville to Mauricetown, Haleyville, Dividing Creek and Port Norris.

NEW YORK, NEW HAVEN & HARTFORD.—A contract has been given by this company to T. Stuart & Son, of Newton, Mass., for building the new West Roxbury and Needham extension of the Woonsocket branch. The work, which includes some heavy excavations, will be completed in about one year.

NEW YORK, WESTCHESTER & BOSTON (ELECTRIC).—This company appears to have nearly or quite won its contest with its rival, the New York & Port Chester, regarding rights in the Borough of the Bronx, New York City, and work on grading the line has been going on in a small way for two or three months; and this week a contract has been let to James P. McDonald, 42 Broadway, New York City, for the building of the line from 177th street, New York, northward to the city boundary, about 4¼ miles. An officer of the company says that the defects in the charter of this road, which was incorporated in 1872, were fully cured by an act passed in 1903. The company has now been authorized by the State Railroad Commission to increase its capital from \$1,000,000 to \$20,000,000. The necessary right of way through New York City has also been granted. The proposed line is from a point on the Harlem river at 129th street, in New York City, north through West Farms, Westchester, Bay Chester, Pelham Manor, Pelham, New Rochelle, Larchmont, Mamaroneck, Harrison and Rye to Port Chester on the New York-Connecticut state line, with a branch from or near Pelham through Mt. Vernon, Alameda Park, Fairview Park, Tuckahoe, Arthur Manor and Scarsdale to White Plains, N. Y., a total length of 38 miles. A branch is proposed also from West Farms east to Throggs Neck on Long Island sound. William L. Bull is President, and William A. Pratt, Chief Engineer, 30 Broad street, New York. (See page 164.)

OKLAHOMA CITY TERMINAL.—A charter has been granted this company in Oklahoma to build a terminal railroad from a point two miles northwest of Oklahoma City through the city to South Oklahoma, a distance of about six miles, at an estimated cost of about \$300,000; also to build side tracks, spurs and freight and passenger stations. The directors include: T. D. Turner, J. H. Wheeler, J. L. Wilkin, R. D. Edwards and others, of Oklahoma City.

PENOBSCOT CENTRAL (ELECTRIC).—This road, which extends from Bangor, Me., northwest to Charleston, a distance of about 26 miles, and which was sold last November by the bondholders for \$174,000, has been resold to a syndicate of Bangor and New York capitalists, who will improve the road.

PITTSBURG, BINGHAMTON & EASTERN.—A contract has been given by this company to John R. Lee & Co., of New York, for building its line from Binghamton, N. Y., southeast to Ansonia, Pa., a distance of 140 miles. The contractors expect to commence work early next month. The contract calls for the completion of the work in 18 months. (July 21, p. 23.)

PITTSBURG RAILWAYS (ELECTRIC).—This company will immediately begin extensions on the north and south sides of the Ohio river to connect Pittsburgh with the Beaver Valley Traction Company's system, which it recently purchased.

PLANT CITY, ARCADIA & GULF.—This company, which bought 12 miles of railroad out of Plant City, is building an extension of its road from Keysville, Fla., south to Fort Green, a distance of 30 miles. (See Construction Record.)

QUINNESEC & WESTERN.—This company has been incorporated in Michigan with a capital stock of \$120,000 to build a railroad in Menominee County about 15 miles long, connecting with the Wisconsin & Michigan. The incorporators are W. T. Fitzgerald and S. N. Harrison, Peshtigo, Wis.; E. C. Eastman, Marinette; J. B. Barton, Hinsdale; and O. A. Koss, J. C. Fitzgerald and T. M. Butters, Chicago.

ST. PAUL & DES MOINES.—This company, which was organized

in Iowa to build an extension of the Des Moines, Iowa Falls & Northern from Iowa Falls north to Mason City, has surveyors locating the line northeast from Iowa Falls half way to Hampton. Construction work will be started shortly by the contractors, the Iowa Construction Co., organized by the officers of the Des Moines, Iowa Falls & Northern. (July 7, p. 8.)

SHORT LINE DEVELOPMENT & CONSTRUCTION COMPANY.—A company under this name has been chartered in Washington with a capital of \$3,000,000, and headquarters at Seattle, to build railroads in Alaska. The incorporators include Thomas Flammar and Martin Bosworth, of Seattle, and Grant Hamilton, of Denver.

SIoux CITY & IRETON (ELECTRIC).—Articles of incorporation have been filed by this company in Iowa. The authorized capital stock is \$500,000, and Sioux City will be headquarters. The company proposes to build a line from Sioux City north to Ireton, Iowa, 38 miles. Electric power will probably be used. The directors are James Ahrens, D. Montgomery, M. A. Karr, Henry Meinen, H. D. Eilers, J. G. Grabner, Wm. McAuliffe, L. Borschers and Thomas Stinton. The company has already been granted a franchise to construct and operate its lines on the streets of Ireton. Arrangements will probably be made with the Sioux City Traction company for entrance into Sioux City over the lines of the latter company.

SOUTHEASTERN RAILROAD.—An officer writes that surveys have been completed and rights of way are being secured for its proposed railroad to be built from Leslie, Ark., southeast to Garner, 105 miles, and thence to Little Rock. The proposed road will have a ruling grade of .6 per cent. and curves of 8 degrees. Contracts for the work will soon be let. George L. Sands is President and S. W. Lee, Chief Engineer. (See Southeastern Arkansas, July 28, p. 32.)

SOUTHERN RAILWAY.—An officer writes in regard to the proposed line of this company to be built from Chattanooga to Stevenson, Alabama, that the contracts for the tunnel through Lookout Mountain and for masonry in connection with Tennessee River Bridge have been let. Bids have been asked for doing the grading, but no date has been named for the letting of the contract. The proposed line will be built from Chattanooga to Stevenson, Ala., in a southwesterly direction for a distance of 4½ miles. W. J. Oliver & Company, Knoxville, Tenn., have taken the contract for the tunnel, and B. H. Hardaway for the bridge masonry at the Tennessee River. The contractors are now working on the tunnel but no grading has been done or track laid. The tunnel and bridge are the most important work, and until this work is well advanced the contract for grading will not be awarded. The maximum east bound grade is 33 ft. per mile. Maximum west bound grade 1 per cent. with a maximum curvature of 6 degrees. This new line will involve the construction of draw bridge across Tennessee River about 15 miles west of Chattanooga, and several bridges of no importance and also one small tunnel about seven miles from Chattanooga; and a very light amount of trestle.

SOUTH SIDE COAL & IRON COMPANY OF ARKANSAS.—An officer writes that the construction of this proposed road will be begun October 1. The route is from Paris, Ark., east to Dardanelle, a distance of 38 miles, with branches aggregating 12 miles. George D. Locke is Vice-President, Missouri Trust Building, St. Louis.

TENNESSEE RAILWAY.—The Burgin Construction Co., of North Carolina, has been awarded the contract for the construction of the extension of this road for 14 miles from a point seven miles from Oneida, Tenn.

TEXAS ROADS.—A road, which has been under consideration for some time, and of which Ed. Kennedy is said to be a promoter, is to be built at once under the supervision of the Houston, Beaumont & Red River Construction Co., which has given the contract for the first 40 miles to P. R. Turney. The proposed route is from Houston, Tex., northeast through North Dayton, Perryman, Batson, Saratoga, Kountz, Jasper and Leesville to Alexandria, La., a distance of about 200 miles, crossing the Sabine River at a point 80 miles north of the Southern Pacific and 100 miles south of the Houston East & West Texas, passing through a rich agricultural section of southeast Texas. Contracts for the balance of the route will be let as soon as the surveys have been completed.

TIDEWATER RAILROAD.—This company has commenced the construction of the line connecting Norfolk, Va., with Seawall's Point. It is the intention of the company to build the first 100 miles of its road from the Tidewater terminal west as early as possible. (May 26, p. 175.)

TRINITY & BRAZOS VALLEY.—A contract has been given by this company to Johnson Bros., of St. Elmo, Ill., for building 180 miles of its road from Mexia, Tex., to Houston. The contract calls for the completion of the work within one year, and it is said that when finished the road will be turned over to the Colorado & Southern and operated as a part of that system.

WEST MICHIGAN.—Articles of incorporation have been filed by

this company in Michigan with a capital stock of \$700,000 to build a railroad from Benton Harbor and St. Joseph to Dowagiac, Cassopolis, Paw Paw and Kalamazoo, a distance of about 85 miles. The directors are D. L. Browne, Pittsburg, Pa.; A. P. Cady, H. D. Deam, E. J. Stevens and A. H. Deam, Benton Harbor.

WYOMING CENTRAL (CHICAGO & NORTH-WESTERN).—Amended articles of incorporation have been filed by this road in Wyoming increasing its capital stock to \$13,500,000. The increase is necessitated by the change in the plans so as to extend the Casper-Lander line beyond its original destination. It is proposed to build into Idaho and thence to Salt Lake City and possibly to the Pacific coast. The contract let about a month ago provided for an extension from Casper only as far as Poison Spider creek, at the eastern end of the Indian reservation. It is now intended shortly to build 35 miles beyond Poison Spider creek.

YULE CREEK.—Incorporation has been granted this company in Colorado to build a railroad from Bryant, in Garfield County, through Pitkin and Gunnison counties, following the Crystal river to its confluence with Yule creek, and thence along this creek to its source. The cost of the road will be about \$200,000. G. W. Bowen, S. I. Heyn, Pope Clerk, A. E. Davis and R. E. Black, of Denver, and J. B. Bowen and W. R. Jewell, of Redstone, are interested.

RAILROAD CORPORATION NEWS.

ALBERTA RAILROAD & IRRIGATION.—The lines taken over by this company include the Alberta Railroad & Coal Co., 66 miles; the St. Mary's river, 19 miles and a Cardston branch of 48 miles. Several extensions have been authorized. The entire line is now being made standard gauge.

BANGOR & NORTHERN.—This company has been organized to take over the property and franchises of the Penobscot Central, which runs from Bangor to Charleston, Me., 26 miles. The new company is capitalized at \$150,000 and the following officers have been elected: John R. Graham, President; F. D. Oliver, Treasurer; and John R. Graham, C. D. Stamford, Charles V. Lord and Franklin A. Wilson, directors.

BUFFALO & SUSQUEHANNA RAILWAY.—Application has been made to the New York Stock Exchange to list \$2,216,000 additional first refunding 4½ per cent. bonds of 1951, making the total amount \$6,521,000.

BUFFALO, ROCHESTER & PITTSBURG.—The report of this company for the year ending June 30 shows gross earnings of \$8,161,079, an increase of \$631,121 over the preceding year. Net earnings were \$3,102,266, a decrease of \$18,885, and charges, taxes, etc., were increased by \$107,108, leaving \$126,000 less than the previous year to be applied to the payment of dividends and for improvements. The ton miles were the greatest in the history of the road. The road hauled 6,234,260 tons of bituminous coal, an increase of 1,326,000 tons, and freight tonnage showed an increase of 1,647,000 over the previous year.

CHESAPEAKE & OHIO.—Gross earnings for the year ending June 30 increased \$1,426,846, or 7.4 per cent., and net earnings, \$959,070, or 14.7 per cent., over the preceding year.

CHICAGO GREAT WESTERN.—This company has absorbed the Mason City & Clear Lake (electric), which runs from Mason City to Clear Lake, Iowa, 18 miles, and the Waterloo, Cedar Falls & Northern (electric), which runs from Waterloo through Cedar Falls to Sumner, 56 miles, and which operates a steam line from Sumner to Waverly, 33 miles, under lease from the Chicago Great Western.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—This company has declared semi-annual dividends of 3½ per cent. each on the preferred and common stocks. A semi-annual dividend of 3½ per cent. on these stocks was declared last January, before which time the following dividends had been declared: 2 per cent. annually in 1898 and 1897, 3½ per cent. annually in 1899, 5 per cent. annually from 1899 to 1902 and 6 per cent. annually since 1902.

CHICAGO SOUTHERN.—This company is about completing its road, and expects by the first of next year to have it in operation from the state line between Illinois and Indiana to a connection with the Chicago Terminal Transfer Co., of Chicago, a distance of 114 miles. It is as an extension of the Southern Indiana. The company is offering through King, Hodenpyl & Co., of New York and Chicago, at par \$4,000,000 in two-year 5 per cent. gold coupon bond notes. The Southern Indiana guarantees these bond notes unconditionally. The notes are further secured by a deposit with the trustee of all the capital stock of the Southern Indiana Railway Co., \$11,000,000, and of the capital stock of the Chicago Southern Railway, \$600,000. The capitalization of the latter is: Common stock, \$1,500,000; gold coupon bond notes, \$4,000,000; bonded debt, none. No mortgage can be made prior to the pay-

ment of these notes. The Girard Trust Co., of Philadelphia, is the trustee.

CENTRAL OF CANADA.—At a recent meeting of the shareholders it was decided to issue mortgage bonds on account of construction and also to increase the capital stock of the company.

CENTRAL OF GEORGIA.—This company has declared 5 per cent. interest payable on each of the following classes of bonds: \$4,000,000 first, \$7,000,000 second and \$4,000,000 third income bonds. The first income bonds have received 5 per cent. since 1903, having received 3 per cent. in 1902, 5 per cent. in 1901 and 3¼ per cent. in 1900. Before that the rate varied from 1½ per cent. to 2¼ per cent. The only interest ever paid on the second income bonds was 2 per cent. in October, 1904, and no interest has ever been paid on the third income bonds until now.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—This company has filed a certificate in Ohio increasing its common stock (as authorized by the directors on June 21 last) from \$28,700,000 to \$40,000,000.

This company has listed on the New York Stock Exchange \$1,000,000 additional general-mortgage 4 per cent. bonds of 1903, making the total listed \$20,749,000.

COLORADO & SOUTHERN.—This company has issued a call through Hallgarten & Co. for 40 per cent. of the subscription to the issue of \$15,000,000 refunding and extension 4½ per cent. mortgage bonds, of which \$100,000,000 were authorized several months ago. The proceeds will be used for extending the road to the Gulf of Mexico.

GALVESTON, HARRISBURG & SAN ANTONIO.—The stockholders of the Gulf, Western Texas & Pacific and the New York, Texas & Mexican have authorized the sale of these roads to the Galveston, Harrisburg & San Antonio. (July 21, p. 24.)

HARTFORD STREET RAILWAY (CONNECTICUT).—A meeting of the shareholders will be held on September 6 for the purpose of acting upon a proposition to sell the property to the Consolidated Railway Co. Permission has been granted the Hartford Street Railway Co. by the Connecticut Legislature to increase its capital stock from \$2,000,000 to \$5,000,000 and to the subsidiary East Hartford & Glastonbury Street Railway Co. to increase its capital stock to \$1,000,000.

LAKE SHORE & MICHIGAN SOUTHERN.—This company has listed on the New York Stock Exchange \$7,500,000 additional 4 per cent. 25-year debenture bonds of 1928 and has been granted permission to list an additional \$2,500,000 when sold and delivered.

MEXICAN CENTRAL.—The net earnings of this company for the month ending June 30 show an increase of \$86,825, and for the year, an increase of \$1,058,096. This large increase is practically due to a decrease in expenses, and also to the operation of the Monterey line from Monterey to Tampico, Mex., which commenced operation on June 1, 1904, but was not satisfactorily run as a through line until the beginning of the last fiscal year.

MICHIGAN CENTRAL.—This company has absorbed the Charlevoix & Detroit, a logging road running from Frederic, Mich., to East Jordan, 43½ miles, with a branch from Blue Lake Junction to Blue Lake, eight miles.

MISSOURI, KANSAS & TEXAS.—H. W. Poor & Co., of New York and Boston, are offering at 89½, \$3,000,000 first and refunding mortgage 4 per cent. M., K. & T. gold bonds, due September 1, 2004. This is part of an authorized issue of \$40,000,000, of which \$1,484,000 are already issued, and they are to be used for the acquisition of additional real estate and rolling stock. The balance of the authorized issue is to be used as follows: \$12,037,000 for refunding outstanding bonds; \$23,479,000 for future issue for new line at the rate of \$25,000 a mile, and for terminals and rolling stock as required.

ST. LOUIS SOUTHWESTERN.—A meeting of the shareholders will be held on October 4 to vote on authorizing the guarantee of an issue of first-mortgage 5 per cent. fifty-year gold bonds of the Shreveport Bridge & Terminal Co. to an amount not exceeding \$500,000 principal; also to authorize an agreement with the same company providing for the use and occupancy of its bridge and other works for a period of fifty years.

WESTERN MARYLAND.—This company has listed with the New York Stock Exchange \$1,402,000 additional first-mortgage 4 per cent. bonds of 1952, making the total amount \$31,924,000. The bonds just listed are part of the \$14,518,700 (of which \$4,436,000 have already been issued) reserved for the construction of branches and extensions, equipment and improvements and for the completion of the Piedmont & Cumberland and the Coal & Iron Railway.

